RAILROAD GAZETTE

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Contributions.

Steel Boiler Flues.

Shelby Steel Tube Co.,
Cleveland, O., Feb. 28.

To the Editor of the Railroad Gazette:

Referring to the letter concerning safe ends for steel boiler tubes on page 135, Railroad Gazette of Feb. 24, we think the inclosed letter, which we have just received, and which is one of many forwarded to us, will be of interest to you. The letter, which is from the Columbus, Hocking Valley & Toledo Ry. Company is very short, but to the point. We shipped this company some steel flue safe ends to be welded to knobbled iron and steel.

W. S. MILLER, Treas.

The letter referred to is: "We have made a test of the safe ends and same are highly satisfactory. You shall hear from us when we are in the market." This "short and to the point" letter from the railroad company is also interesting as an example of vile English. This way of using same can be tolerated in the office boy, but not in any one above him. Of course, the writer meant you will hear from us, and not you shall.

Tests of Locomotive Boiler Coverings.

Keasbey & Mattison Co.,
Ambler, Pa., Feb. 24.

To the Editor of the Railroad Gazette:

Referring to the published report of the proceedings of the Western Railway Club, embodying a synopsis of the paper by Mr. Quayle, Superintendent of Motive Power of the Northwestern, giving a report of the test of locomotive laggings at Clinton, Iowa, in August last, we have not felt called upon up to the present time to make much comment upon this test, because the general purpose of the test itself was to indicate the general value of the commercial coverings as compared with the bare boiler. So far as carrying out this purpose is concerned the report is very useful, and we believe so nearly correct that the results may be safely relied upon.

An effort, however, has been made upon the part of some other people to make it appear that the test was either intended to show, or else does actually show, the relative merits of the several laggings tested. We protest against this latter, and the report itself shows that such a protest is justifiable. The proper place to test the relative non-heat-conducting properties of various materials is in the laboratory, or at least some place where the general conditions can be controlled and made uniform for all the materials. The conditions at Clinton, Iowa, were not uniform, one lagging being tested on one day and another taken upon the following day. There was not so much difference in atmospheric temperature, there was not so much variation in the force of the wind, possibly there was not so much variation in any of the conditions; but there was a variation, and in favor of what lagging or laggings tested, no one, not even Professor Goss or Mr. Quayle, is in position to state. A careful perusal of Professor Goss' report will indicate that he knows very well that there were conditions considerably modifying the results. In his report he returns again and again to the matter of the force and direction of the wind.

You will notice by the report that two tests were made of the H. W. Johns Company's laggings, that is D1 and 2 (for as other people are mentioning and publishing the names of the manufacturers of the coverings, we might as well do so also), and of the Keasbey & Mattison Company's Magnesia Lagging, F1 and 2. The tests of these materials were repeated because at the end of the first test there was evidence of moisture in the lagging. The second test of the Johns lagging was made with a dryer material, and, as the report shows, with a thicker material. The result is in favor of the wetter and thinner material. There is an appreciable difference between these two results: a difference amounting to enough in the course of a year's use of the material to pay for its cost. Is any one who is in any way responsible for the test or its results willing to make the statement that a lagging which is thinner and wetter than another lagging of the same material should give better results? If such results are not obtainable, then what was the nature and source of the error, and did the same error extend to the testing of the other laggings? To one of them it did. The second test of magnesia was made because the first lagging was put on in the round house under a leaky roof, and, to use the expression of one of the men who applied the material, "during one of the worst thunder storms he ever witnessed." The Russia iron jacket sheets had to be employed to divert the streams of water from the leaky roof from playing directly upon the magnesia blocks as they were applied, but in spite of this one of the persons engaged in the application avers that at least a half a barrelful of water must have gone into the material. The material was tested on the following day, and because of a protest made the test was repeated. The lagging had in the meantime some chance to have its mosture evaporated. The first test with the wet lagging showed better results than the second with the dryer one.

Professor Goss states with reference to the wind, that a correction should be made on account of the effect of this particular influence; the lagging that made the best report should have a subtraction made from its showing; some of the other laggings should have an addition. To what extent in either case we are not told, in fact, who is in position to tell? We should have no criticism whatever to make upon Mr. Quayle's paper or upon Professor Goss' report if the results arrived at were accepted with respect to their value as determining the amount to be saved by covering a boiler with a good commercial lagging. Our criticsm is based upon any effort to pervert the showing made at Clinton, Iowa, into a comparison of different materials.

Having demonstrated now that it pays and pays largely to cover a boiler, and having perhaps aroused a considerable amount of curiosity in the minds of many master mechanics as to what covering possesses the greater economic value, why not go a little further and spend some money in making a more accurate and thoroughly scientific test of the value of these same materials and others under such conditions that the results can be relied upon? Professor Goss is competent and Mr. Quayle is fair-minded enough to be entrusted with such a test, and we have no doubt that the various steam users throughout the country would be glad to have the results. As the manufacturers of Magnesia lagging, we would like to have our material participate in such a test. We are anxious to have correct information obtained and disseminated, but we don't want any garbled reports or any jumped-at conclusions published under the title of authoritative information.

Your contemporary, "The Railway Age," in its issue of Feb. 17 tells us that the Franklin Manufacturing Company's laggings, tested under the symbol "G," showed a saving of 69.1, making the best showing in comparison, none of the other laggings making anything like so favorable a comparison. Possibly this mistake can be traced to some luckless compositor, who, of course, was not in position to know that the Franklin lagging did not make even so good a showing as the nondescript mixture of asbestos, lime and sawdust. We are also somewhat surprised to note in the same journal that the Franklin Company's lagging is designated as asbestos-magnesia. The description of the lagging tested as furnished to Professor Goss does not call it asbestos-"magnesia," and we have beeen wondering whether any master mechanic, or in fact any one else who has anything to do with steam pipe coverings, knows what asbestos-magnesia is. The title would indicate a certain proportion of that form of magnesia which had made so good a record for itself on the locomotive boilers that have been built or equipped during the past ten or twelve years. In the description furnished to Professor Goss, we are not told that it contains even a small percentage of this valuable material.

We are glad that this test has been made, and will be glad to see a full and free discussion of the subject, not because this test is valuable in itself as showing the relative merits of various materials, but because we believe the outcome of the discussion and of the interest awakened will be such a subsequent test as we have suggested. Mr. Quayle has set the ball rolling, and is entitled to a great deal of credit. He has accomplished all that could be accomplished in such a test, and his results should not be misrepresented or published as indicating what they were never intended to cover.

GEORGE R. WALLACE,
Second Vice-President.

The M. C. B. Coupler—Its History and its Performance in Service.

By Wm. Garslang.*

In answer to some of the criticisms that have been published regarding the M. C. B. coupler, I have been requested to make a report, giving my opinion and experience with the device as it now is and the possibilities of improvement.

In 1882 there were in the United States some hundreds of thousand freight cars of all descriptions; these cars were equipped with what we will call the old style drawbar. The failures caused from this class of couplers and the loss of life and limb were sufficient cause to demand some better coupling, both to reduce breakages of the cars and decrease the loss of life. About that time there were some two hundred or more different classes or kinds of drawbars in use, most of which had some standard features regarding size of link and pin and length and size of shank. This feature had been agitated for some time with considerable success, so at the first effort to meet legislation in the different states and provide a coupler that would be safer, stronger, and at the same time automatic, what was the result? There were thousands of schemes for converting the old drawbar into an automatic coupler, and it is safe to say that every railroad in the country tried or witnessed some of them, with the result that not one proved satisfactory, or could be made to operate at all automatically, when cars had any considerable difference in height, were on a curve or had to be coupled with any other class of drawhead.

We will now pass out of the individual effort in trying to accomplish the desired result and take the matter from where it was first presented to the M. C. B. Convention for action, which was in 1883. The time spent and the discussions that followed by the railroads represented was probably far in excess of any other matter ever presented to the railroad associations. The first committee appointed made their report at Saratoga, in June, 1884. They had at that time sent out circulars of inquiry to all roads represented. The labors of the committee included the examination of all the models presented and the working test, when possible, with the result that the findings showed so many models of practically the same and conflicting designs that they were unable to make any recommendation, further than to classify as worthy of special mention some seven or eight couplers and as meritorious as many more.

During this meeting the coupler question was the principal subject for discussion, and brought out many facts showing the necessity for the adoption of an automatic coupler both from a railroad standpoint and to come in line with the requirements of the laws then being enacted. It was the opinion of this early meeting that the only coupler that could be a mechanical success and couple to cars of varying heights and conditions would have to be made on the vertical plane line and one that would do away with the link and pin.

We pass the vast amount of work done by this association and the railroad companies in trying to decide what coupler or what kind of coupler would meet all requirements and would be the best to adopt which time included the tests at Burlington and Buffalo, where so much information was gained between the meeting in 1884 and the meeting at Minneapolis, in 1887. We all know that the time and money spent were great and the trials and tests made during these three years were exhaustive. The Railroad Commissioners in many states had threatened time and time again to take the matter out of the hands of the railroads and name a coupler or a lot of couplers themselves some one of which they would adopt and require applied if the matter was not hurried more. And they did, in some cases, complicate the matter by opening the door for various devices with a certain official recognition. The M. C. B. committees still continued to hang on and experiment in their effort to have the coupler finally adopted as nearly perfect as possible.

We find at the meeting of 1887 the committee ready to make a final report. The association had been severely criticised on account of the time spent in consideration of the subject, but time has proved that the time was well spent and that disastrous mistakes were avoided. The problems the committee had to deal with were very knotty ones; over 4,000 so-called automatic couplers had been recorded in the Patent Office and every individual demanded consideration. It was realized that the strength had necessitated searching investigations, and it was predicted that the metal used would have to be strengthened and improved as the service became heavier, and further that an entirely different metal would have to be used—one possessing greater strength than anything then made into couplers.

During the years of trials, opinion had altered regarding automatic couplers, and roads no longer expected to get automatic couplers for the same price as the old bull nose, but were prepared to pay for improvements that cut down their operating expenses.

The form of coupler being decided on at this meeting, the question was submitted to letter ballot and declared carried and adopted at Alexandria Bay, June, 1888. Can any one conscientiously say that this matter did not receive all the consideration that was at the disposal of the railroad companies to give it?

The lines finally adopted and the patents presented to the railroads were the contour lines belonging to the Janney Coupler Co., which had been used on passenger cars since 1876 and were no experiment. Now, after the labors of this association were completed and the contour lines adopted—which was only done after the surrender of the patents held by the Janney Company, which enabled all makers and all roads to use them—there was another step necessary in the line of advancement of standards, which was to regulate the size and length of shank, size and position of holes and the bearing and connecting points, so that couplers, wherever made or applied, could be repaired or replaced on any

*Supt. Motive Power, Cleveland, Cincinnati, Chicago & St. Louis Ry.

road on which the owners cars should happen to be when such parts became inoperative.

In adopting a coupler which in itself was going to be a source of large outlay to the roads, it was essential to keep the changes necessary on the cars down to a minimum to prevent the expense of application being more than our companies would stand, provided this could be done without prejudice to the coupler for present or future requirements. A shank as nearly like the best practice then prevailing as possible was adopted, but not until its strength and possible increase were taken fully into account. There was a reasonable allowance left for future strength to meet the increase in weights of cars, and the shanks of couplers to-day when made of the best materials, will stand any demands made on them at that point by the heaviest equipment, and have a breaking strain far in excess of the combined power of any three or four locomotives ever built. There is a possibility yet of making the thickness of the material in these shanks greater and better to stand any increasing demands. For instance, the shank of an M. C. B. coupler, made of steel and one inch thick, will have a breaking strain of more than 1,000,000 pounds, which is a force that can never be exerted in fair usage. It is, therefore, no more than fair to the design and size of that part of the coupler to say it can always be made to meet the requirements, under fair usage, which is something that cannot be said about any other part of the car

Now, in regard to the other end. There can be no fair criticism advanced against its practicability to couple automatically under all reasonable conditions and to remain coupled unless defective, either from wear or the locking pin not doing its duty. There is some question regarding the shape of the inner or wearing side of the knuckle being of the best design to prevent wear, or, rather, to confine the wear to the hook shape. This is accomplished by some of the couplers now on the market, and does not affect the contour lines or wearing points of the coupler as adopted. It is a matter that will no doubt have due consideration at the next convention.

The coupler as made to-day, without changing any of the important lines, is from 15 to 25 per cent. heavier and stronger than when first made for cars of lighter capacity, and there is abundant possibility to still increase its weight and strength by the adoption and betterment of material.

The statement has been made by some writers that the M. C. B. coupler did not give a center line of draft and that the blow when coming together was not on central lines. While this would appear to be the case while looking at a single coupler, but it is not the case when two couplers are pulled or bunted together. Hook two couplers and suspend them from one end (this only refers to couplers made strictly to M. C. B. lines), then suspend a plumb line by them. The line will prove the couplers to maintain a straight line from end to end of shank. Or repeat the experiment often tried of fitting up two cars without side chaffing irons, or make the iron very wide, and notice the draft line when the cars are being hauled on a straight track. The space between the chaffing irons will be found to remain evenly divided, showing a direct pull carried back to the end of the couplers. In buffing the severe strain is to be absorbed by the buffer blocks, but before they come in contact the couplers, in coming together and locking, make a very direct strain on the center of the car and almost entirely prevent the side strains usual with the bevel faces of the old style drawhead moving sideways.

It has again been contended that the couplers were not flexible. With regard to that matter it has been recognized by the larger part of our railroad management that one of the great features of the M. C. B. coupler was to eliminate the slack in the train and to prevent to considerable extent the swaying of cars from side to side while running on a straight track, which is injurious to the cars as well as dangerous to the men who have to pass over them. Probably no one feature contributed more largely to the adoption of the hook coupler than the results obtained by the close and spring coupling at the Burlington brake tests and subsequent trials made specially for this purpose. It has long been thought absolutely necessary that there should be a considerable amount of loose slack in the couplings of cars to ease the starting of trains, and, while it had been admitted that there were some disadvantages incident to the presence of slack, such as breaking drawbars and draft rigging, in starting and stopping, pulling through sags and hollows in the track, it was never realized until these tests what an enormous evil the presence of slack was in long trains and how terrific the shock.

During these tests it was found absolutely necessary to block the links; without blocking it was found impossible to live in the rear car; stock could not have stood on their feet or freight been prevented from shifting. Since it has been abundantly proved that a locomotive will start and haul as many cars with the close couplings as with the slack link, and haul the train without the shock, making it possible to use airbrakes on freight trains, we think the foresight in adopting a coupler eliminating this part of the flexibility of the old drawhead the most commendable; and had any device containing this feature been adopted we would now be ready to discard it.

There is still another feature in its favor. Cars of varying height can be readily coupled, and the difference in height or the difference in spring action has no tendency to throw the load of the low car on to the high, which was formerly the cause of breaking so many links and causing trains to part.

If couplers do not couple it is because of defects in their manufacture, and not in the lines adopted by the M. C. B. Association. In all the tests made for years, the question of coupling was raised and tested and it was found that the M. C. B. coupler coupled readily on curves up to 20°. There are some couplers made without any regard for the location of the hinge for the knuckle that will not do this.

When the M. C. B. coupler was adopted the roads were entirely equipped with the link-and-pin drawbar, therefore the automatic coupler had to be constructed so that it would couple with these cars until they were changed. To accomplish this, the knuckle—already the weakest part—had to be further weakened temporarily to admit of the link-and-pin connection. Now, as 90 per cent. of the breakages occur to the knuckle on account of this weakness, it is safe to pass this matter by, saying that in a very short time all couplers will be made with solid knuckles, thereby increasing the strength and wearing surface of this part more than 50 per cent. In further proof of this some of the roads are now getting their couplers with solid knuckles, and report practically no trouble from knuckles failing.

There has been complaint made of accidents caused by couplers pulling out and falling on the track. When we consider the thousands of couplers put in old cars with light and insecure draft rigging and think of these cars being run in trains with the modern, heavy car of to-day, with the powerful engines in use, it is only a matter of surprise that there are not more failures, and we do not think the fault should be charged to the coupler, but to the car.

Now, regarding construction. When the M. C. B. Association adopted the automatic coupler they also adopted a fastening for the rear end and a buffer for the front of cars, and it is the opinion of this committee that one feature is as essential as the other, and that the buffer is an absolute necessity to protect the draft rigging and coupler from the numerous shocks when cars are being switched, and it is not until these precautions are taken that we can expect to get all of the benefits that the coupler is able to give us.

When it is remembered our cars have increased from 50,000 to 100,000 lbs. capacity and our engines from 130,000 to 200,000 lbs. in weight, and that all our present cars have stronger draft rigging, stronger couplers and adequate buffer blocks for their protection, but that we do not separate these cars in our trains, but couple them, probably, to a car of ten years ago, with lighter draft rigging, light couplers and no buffer blocks, we must expect failures; not in the new cars, but in the old ones, and we find on careful inquiry that that is where the failures do to a large extent occur. We can to a certain extent remedy this by sorting out our trains, but, if less expensive, take the failures caused by not doing so.

The result of the researches and our opinion is that the M. C. B. coupler, as adopted, is the best device for the purpose that has been presented to the railroad companies from any source. That the coupler, made strictly to the contour lines adopted, will couple under all ordinary conditions; that it admits of being strengthened to meet the requirements of heavier service; that the line of pulling and puffing is as central as any coupler of its same length; that it is able to stand the shocks of switching when protected by buffers; that the coupler admits of the successful running of long trains of heavy cars and the use of air-brakes on such trains; that the saving in repairs by its use amounts to something like $1.50 per car per year; that the present cost of links and pins will more than double the cost of repairs to couplers, and that it is as strong and long-lived as other parts of the car.

Now, in conclusion, we wish to emphasize the fact that this report is based on that class of couplers that embody good workmanship and material, and is in no way a defence for some couplers in the market that have been used by various railroads for other reasons than their mechanical worth. That couplers of this description would prove failures has been fully predicted. On the other hand, there are couplers costing but very little more that can be relied upon to give satisfaction, and the purchaser can get good couplers by paying for them.

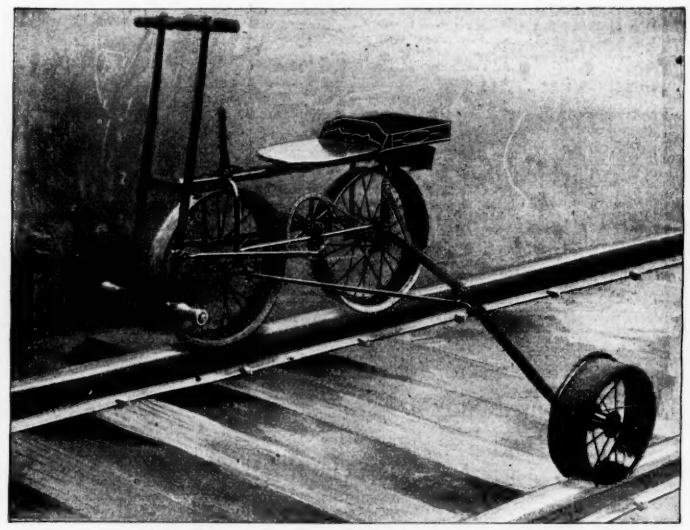
Regarding strength: Couplers can be purchased today that the makers will guarantee to stand from five to eight blows of 1,640 lbs. with 5-ft. drop on the guard arm and will stand a pulling strain of from 175,000 to 200,000 lbs. without injury to the knuckle or locking device. We do not think it necessary to require such strength as this for any cars or engines yet constructed, but those who do can be supplied.

We do not think it will be amiss to again compliment the gentlemen comprising the coupler committee on the successful result of their labors, believing that they adopted the only device that could have accomplished the results that have been obtained, nor can we refrain from suggesting that the severest critics have been those who had the fewest couplers in use, and we believe, for that reason, would be least likely to know their merits.

Let us all remember that the present automatic coupler is a piece of machinery, and, like our air-brakes and trucks, requires a little attention and occasionally a drop of oil.

A Light Velocipede Car.

The accompanying illustration shows a light three-wheel car recently put on the market by Fairbanks, Morse & Co., Chicago. The frame is made of seamless steel tubing throughout, the wheels have wire spokes and steel treads covered with rubber bands, while roller bearings and hubs similar to those of bicycles are used. The rear axle is driven from the crank shaft by a chain and sproket wheels. The arm which carries the third wheel is also a steel tube, held in place by a brace rod, and hinged to the main frame, so as to be folded up toward the front of the car. The car weighs about 50 lbs., and it is claimed that a speed of from 10 to 12 miles per hour can be readily attained under ordinary conditions.



Light Velocipede Car—Fairbanks, Morse & Co

Tests of Bridge Paint.

By Ira O. Baker.*

The following is a summary of the thesis presented by F. W. Von Oven for the degree of Bachelor of Science in Civil Engineering at the University of Illinois last June. Owing to limitations of time and disappointments in conducting the experiments, the results are not as complete as was planned. A summary of the experiments is presented here by request, because of some interest aroused in the results.

The samples named in Table I. were obtained from the makers for the purpose. All came ready mixed except Nos. 1, 4, and 7, which were received as dry pigment, and Nos. 2 and 12 as paste. These were mixed with linseed oil in the proportions recommended by the makers. To test whether the prepared paints had been mixed with volatile oil (turpentine, benzine, etc.), a puncture was made in the original package and tested with a lighted match. In only two or three cases was the flame disturbed, and then it was doubtful whether it was compressed air or inflammable gas.

Table I.—Tests of Bridge Paints.

Reference No.	Kind of paint.	Weight of one gallon in lbs.	Area covered by one gallon. 1st coat. Sq. ft.	Area covered by one gallon. 2d coat. Sq. ft.	Relative rank when exposed to: Heat.	Salt water.	Sulphurous acid gas.	Nitric acid gas	Relative elasticity.
1	Red lead	31.72	1,778	810	5	3	4	3	11
2	White lead	21.24	1,033	668	12	9	12	4	10
3	Purple iron oxide	11 34	2 093	1,413	8	7	7	5	3
4	Chattanooga iron oxide	14.13	1,067	925	9	4	10	8	8
5	Williamsport iron oxide	12 90	867	859	6	10	11	9	7
6	Superior graphite	9.19	1,2 2	1.218	2	5	8	6	6
7	Mexican graphite	8 57	1 406	1,176	3	12	6	7	5
8	Dixon graphite	8 84	1,441	1,492	4	6	3	10	4
9	Trinidad asphalt	9.52	930	663	1	2	1	1	1
10	Bessemer	13 09	647	774	7	8	9	12	9
11	Carbonizing coating	9 61	1,046	849	11	11	2	11	2
12	Lithogen silicate	17.06	900	1,005	10	1	5	2	12

Weight per Gallon.—In determining the weights per gallon (see Table I.) a known volume was carefully weighed. Extreme care was taken that the paint should be thoroughly mixed. Each result is the mean of at least two, not differing by more than 1 or 2 per cent.

Covering Capacity.—The covering capacity was obtained by applying the paint to 8 in. x 12 in. steel plates. The paints were mixed and applied by an intelligent and experienced painter of the best local reputation. The plates were ordered specially for the purpose, and had dull, clean, smooth surfaces, free from rust or foreign substances. Each result is the mean of three trials.

Resistance to Heat and Hot Gases.—The heat-resisting power of the several paints was tested by suspending a frame containing a series of plates painted with each of the twelve paints, in the smoke duct of a boiler burning bituminous coal. The relative

*Professor of Civil Engineering, University of Illinois.

heat-resisting power as estimated from an examination of the surfaces of the plates is given in Table I. The following descriptions of the condition of the surfaces may be of interest, as showing something of the character of the tests:

"Each plate was covered with many small ridges running in the direction the paint had been brushed in applying it. After heating the brush marks were much more noticeable than before.

9. "Trinidad asphalt—seemingly unaffected. No rust anywhere.

10. "Bessemer—moderately hard, peeled off easily. No rust.

11. "Carbonizing coating—peeled off easily. Rust beneath both one and two coats.

12. "Lithogen silicate—hard and adherent. No rust spots."

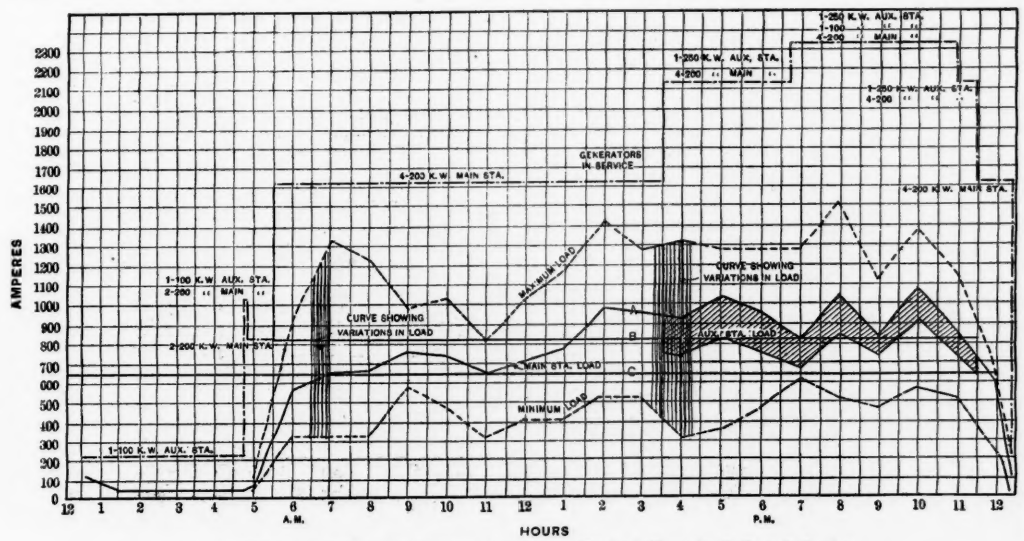
Effect of Acid Gas.—The plates were exposed to the action of strong acid gases for five weeks, during which time fresh acid was frequently introduced. The relative resistances of the paints are shown in columns eight and nine of Table I. "The action of the sulphurous gas was characterized by its bleaching power, the disintegrating effect upon the iron under the paint, and the formation over the entire area of blisters, under which was found a moderately hard, soluble whitish deposit." The effect of the nitric acid gas was substantially the same as sulphurous, except that the former completely destroyed the single coat of paint. The carbonic acid gas in large quantities and supplemented with moisture had only an almost imperceptible effect on any of the paints.

Elasticity.—To determine the relative elasticity of the paints, strips of painted sheet steel were bent to a radius until the paint cracked. The results are shown in Table I. Naturally the heavier coatings are least elastic.

To test whether any of the paints would crack during the elongations of a painted bar, strips of machine steel 2 in. x ½ in. x 18 in. were painted with two coats, and after about two months were pulled in a testing machine. Stresses of 16,000 lbs. per sq. in. were rapidly applied, and in every case the paint remained firm and adhered closely. The stresses were then increased more slowly past the elastic limit, and in no case did the paint crack before the elastic limit of the steel was reached.

In making the last test, it was noticed that after passing the elastic limit of the steel the paint was marked with a series of lines arranged in herring-bone patterns. The patterns on opposite sides of the bars were alike and alike situated, but were not continuous nor regularly distributed on the side of the bar. Evidently the lines were due to the structure of the steel, but no explanation could be given why the steel should have this structure.

Sample sheets for each paint were preserved indoors for reference, and one of each was exposed in the open air, the effect of the weather to be noted from time to time. Large sample bridge members exposed in the open air were also painted with the various paints to determine the effect of ordinary exposure.



agram Showing Variation of Load in a Typical Electric Railroad Station.

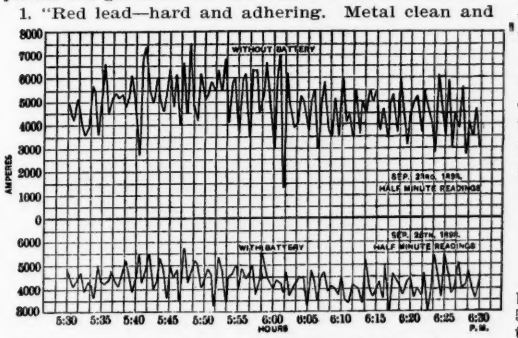


Fig 2.—Generator Load at the Power Station of the South Side Elevated, Chicago.

1. "Red lead—entirely dead and very brittle. The powdery residue was easily removed, bringing into view the bare metal.

2. "White lead—blistered and baked. Coating was brittle, entirely dead, and very easily removed. Removal of residue exposed the bare metal.

3. "Purple iron oxide—covered with blisters. Paint soft and easily removed. Removal of blisters exposed bare metal only to a slight extent.

4. "Chattanooga iron oxide—considerably blistered, moderately soft, adhering well. Removing blisters did not expose bare metal.

5. "Williamsport iron oxide—covered with blisters. Paint tenacious, adhering well. Removing blisters exposed bare metal.

6. "Superior graphite—small blisters. Paint hard and difficult to remove. Almost impossible to expose bare metal.

7. "Mexican graphite—soft and readily removed. Removal of blisters did not expose bare metal.

8. "Dixon graphite—very few minute blisters. Paint hard and adherent.

9. "Trinidad asphalt—smooth, considerable of the paint melted and ran off. The portion remaining was hard and brittle.

10. "Bessemer—soft and hard to scratch off.

11. "Carbonizing coating—ridges very conspicuous. Paint firm and adherent. Removal of blisters exhibited a very porous, loose structure of the paint.

12. "Lithogen silicate—substantially same as other white paint" (white lead).

Effect of Salt Water.—The plates were suspended for seven weeks in a saturated solution of sea salt, the plates being frequently withdrawn and allowed to dry. The estimated relative ranks of the several paints are given in the seventh column of Table I.

1. "Red lead—hard and adhering. Metal clean and bright under two coats, but badly rusted under single coat.

2. "White lead—hard and adhering. Clean metal under two coats, rust under one coat.

3. "Purple iron oxide—firm and adhering. Occasional rust spots throughout.

4. "Chattanooga iron oxide—firm and very adherent. No rust anywhere.

5. "Williamsport iron oxide—firm and adhered only fairly well. Metal under two coats bright, but under one coat considerable rust.

6. "Superior graphite—hard and adhering well. Rust under one coat, none under two.

7. "Mexican graphite—elastic and easily removed. No rust.

8. "Dixon graphite—good condition, elasticity only slightly impaired. Easily removed, no rust.

Storage Batteries and Railroad Power Stations.*

By Mr. Robert McA. Lloyd.

The station from which the curves in Fig. 1 have been taken is situated in a Pennsylvania town of 50,000 people. The roads radiate from the centre of the town to distances of three to nine miles. There are six branches, and the power station is two miles out on the longest branch. It has railroad and water frontage. The small auxiliary power house is the result of a recent consolidation, and is close to the main house.

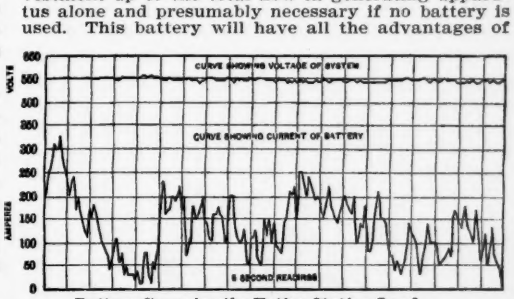
In my endeavor to point out some of the uses for a storage battery, I shall take as a typical station that shown in Fig. 1. The data were obtained on the day of heaviest travel in the whole year, at a time when 35 cars were running. The highest point reached was within the capacity of the main station, and yet is was necessary to start up an auxiliary station. The central solid line shows the average load, and the upper and lower lines show the limits of the fluctuations occurring from moment to moment. The method pursued in getting these curves was to divide the day into half hours, and during the first five minutes of each half hour take the highest and lowest ammeter reading in each minute; these readings are plotted in the upper and lower curves; also to take ammeter readings every five seconds and obtain the average of these readings as the point in the curve of averages. Among some of the interesting features in this diagram may be noticed the fact that the nominal capacity of the generating apparatus was about 400 k. w. in excess of its maximum output occurring at about 8 o'clock in the evening, and that the average output at this time was about two-thirds of the maximum. The excess of nominal capacity was not so great at 7 o'clock in the morning, or 2 in the afternoon when other high points occurred, but as it was known that the morning peak would be of short duration the engineer decided to run through it without the auxiliary station, and in the afternoon the load increased more rapidly than was expected, and the auxiliary was not ready to go into operation on short notice, consequently obliging the main station to groan under a dangerous load for an hour or so.

It will doubtless occur to some that this station apparatus has been over rated, or that the engineer was incapable, or over cautious, but the fact remains that similar data are obtained in very many stations, and that in many cases the apparatus has been subjected to satisfactory tests before acceptance by the purchasers. It may be possible to build engines which regulate at all conditions of load and at the same time use steam satisfactorily at maximum load, but I do not find such engines commonly in use.

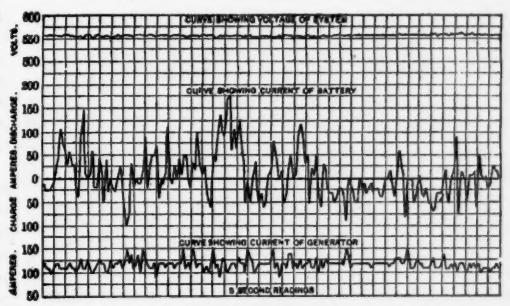
There are three distinct ways of using a storage battery with this power plant. Referring to the diagrams, we find first the great fluctuation between night and day load; second by the fluctuations occurring from hour to hour; and lastly the superimposed fluctuations occurring from moment to moment. We shall call a battery of sufficient capacity to level off the night and day fluctuations "large"; a battery for levelling the hour to hour fluctuations "medium"; and a battery to level the momentary fluctuations "small." It will be seen at a glance that the small battery will reduce the requirements of the generating plant to a capacity sufficient to meet the demands of the average load shown in curve A. The battery must be able to discharge at 650 amperes for momentary periods, but its capacity in ampere hours is unimportant. It will cost less than generating capacity for the same work, and a large part of the excess of capacity over requirements shown in the diagram will be saved. It will save some depreciation on the generating apparatus, and its own depreciation will not cost more than the depreciation of generating apparatus of similar capacity. It will have sufficient storage capacity to run a few night cars and lights when the engines are shut down. If situated at a point nearer the centre of feeder distribution than the location of the generating station, a saving in copper will be effected. Inasmuch as the investment will not be increased by including such a battery in this outfit all the saving in fuel due to a steadier load and the operation of less generating machinery will be clear gain to the credit of the battery.

Line B at 810 amperes shows the average load for 18 hours of the day and a "medium" battery to reduce the load to this straight line would have a capacity of 1,300 ampere hours. It will cost about twice as much as a "small" battery, but will not add enough to the cost of the installation to bring the investment up to the total now in generating apparatus alone and presumably necessary if no battery is used. This battery will have all the advantages of the small plant with wider limits of operation. The station circuit breakers may be set 650 amperes higher, and there will be greater convenience througout the station in operating at a fixed load. There will be a marked effect on the efficiency of all departments of the station, and all the apparatus will yield a higher output in proportion to investment and cost of operation.

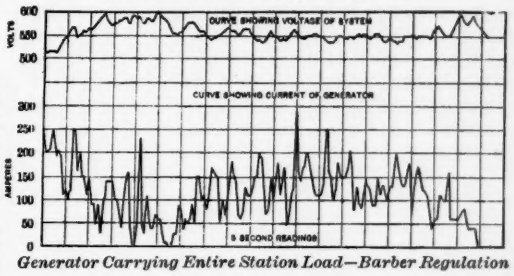
Line C at 650 amperes shows the average load for 24 hours and a "large" battery capable of levelling off this load will have a capacity of 3,000 ampere-hours. It will cost approximately twice as much as



Battery Carrying the Entire Station Load.



Generator and Battery Carrying the Load.



Generator Carrying Entire Station Load—Barber Regulation

Fig. 3.—Tests at the Woonsocket Electric Machine & Power Co.

*From a paper before the American Institute of Electrical Engineers, Feb. 15, 1899.

the "medium" battery, and will have all of its advantages. It will cost as much as the generating machinery displaced by it. It will add largely to the flexibility of the station. This battery could be discharged momentarily at 3,000 amperes, which will put the circuit breaker limit of the station at about 3,600 amperes, instead of 2,300 with all the present apparatus. It may be discharged at 1,500 amperes for one hour, which will be sufficient to cover load peaks that would stall the 1,150 k. w. generating plant completely.

In cases of extreme necessity the entire system might be carried by this battery for several hours. The ability to carry sharp peaks is a distinct addition to the earning power of the system. Such peaks often signify the collection of fares which would be lost if the system were not flexible, and some managers keep up enough station capacity to carry a few holiday crowds, while for 99 per cent. of the whole year it is earning nothing. Other managers do not attempt to carry special crowds. The large battery will give the manager an opportunity to get all the money that can be made out of such business without feeling that he has made any investment for the purpose. Of course the capacity of the system is limited also by the investment in copper, but in many cases the battery may be located so as to facilitate the distribution of power.

There is no reason why a railroad power station of this capacity running night and day at a constant load should not attain a fuel economy as high as that of the well-known Chestnut Hill pumping station at Boston, which would be equivalent in electrical work to 557 watt-hours per pound of coal. Curve A, Fig. 1, shows for one day's work 7,800,000 watt-hours, which required at the above rate seven tons of coal, and assuming that the battery would only have 75 per cent. efficiency, and that 25 per cent. of the entire day's work would go through the battery, ½ ton of coal would be added to this consumption, making 7½ tons of coal per day for this plant running with a large battery.

The battery efficiency in such service as this has been found in most cases much higher than 75 per cent., and in some cases over 90 per cent., so my estimate is clearly on the safe side.

On the day when these data were obtained 15 tons of coal were burned, or twice as much as would be necessary with the battery outfit. The battery would therefore save at $2.00 a ton, $5,474.00 per annum in coal alone.

The number of men in the station is now the same night and day, and there would certainly be no increase in the labor item, whereas it is probable that one man on each shift might be dispensed with if the plant were reduced by the battery, in which case there would be another saving of $1,200 per annum. The battery would also save water, oil, waste, etc., and there would be minor advantages such as more constant potential on the line; less annoyance from circuit breakers; no fear of sudden demands on the generating apparatus, and the disagreeable possibilities incident thereto.

In the following table some figures are tabulated for the purpose of comparing four different layouts to meet the requirements of the railroad referred to in Fig. 1. The cost of real estate and buildings and the repairs and depreciation are estimated the same in each case.

ticularly debatable ground. Mr. Conant allows 2 per cent. for depreciation beyond the normal running repairs. He estimates the entire plant, including buildings, to last 50 years. His statement that the machinery now being installed will last much longer than that with which we have been familiar in the last decade has nothing to back it up except faith in the promises of the builders.

I propose to allow 10 per cent. per annum for repairs and depreciation on the entire station apparatus, including batteries. I have not seen any boilers that are likely to last 50 years, and there is plenty of evidence that all the best engines and boilers in this class of service to-day will go to pieces in a life of from 10 to 20 years. The particularly hard usage to which most of them are subject is not only steadily wearing them out, but producing a state of constant danger and not infrequent accidents. I am sure this is becoming well understood among railway men, and some of the best managers are writing off to depreciation 10 per cent. per annum. Moreover, who can say that improvements will not be made in the next 10 years as in the past, and that engines and boilers may not be out of date before they are used up.

It is of course well known that whatever the rate of depreciation may be without batteries, it will be lowered by giving the generating apparatus a constant load; m belief is, therefore, that the storage battery will not increase the rate of depreciation for the entire plant. If it can be shown that interest and depreciation for a plant of given load dimensions are practically equal with or without a large battery, it is evident that the great saving in fuel alone will determine the superiority of the battery system.

I have so far considered the battery only at the central generating station, so that all the advantages due to locating it at proper points in the distribution system are additional arguments in its favor. In many cases the saving in copper may be greater than the sum invested in the battery, and the flexibility of the system improved in places where it would not pay to install sufficient copper to meet the irregular demands of travel.

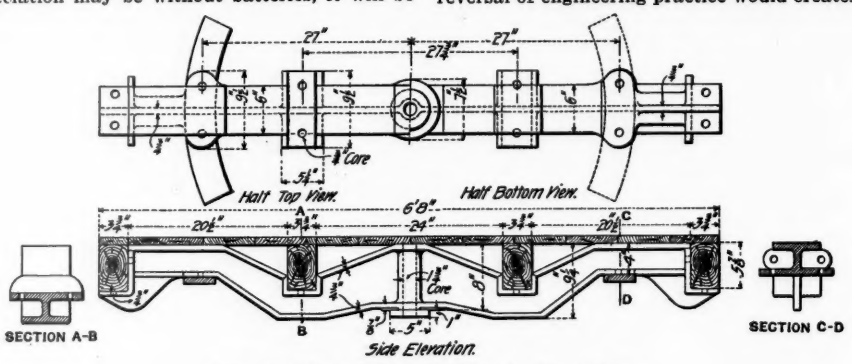
The reserve qualities of the storage battery are road load when the elevated road and the underground rapid transit are included. These peaks will often occur at the same time of day, and so there is no possibility of improving the load factor of either system by splicing the two together. It follows, therefore, that what is true of the relation of a storage battery to the economy of the generating station for power or light separately will be true of the resultant of their combination.

With a million kilowatts in view for the Borough of Manhattan it would be necessary to generate an approximately constant force of 300,000 k. w. A million kilowatts in station plant without the battery factor would cost $100,000,000.

The same capacity including the proportion of battery now deemed advantageous by some of the engineers in touch with these problems would be divided as to cost into $70,000,000 of generating plant and $30,000,000 of battery plant.

Finally, the same capacity, if divided in the proportions which seem to me most productive for the investment, would cost $30,000,000 in generating plant and $70,000,000 in battery.

This is quite a large battery plant, and as there would be more than two parts battery to one part generator, I am fearful of the jealousy which such a reversal of engineering practice would create.



Cast Steel Body Bolster for Electric Street Cars.

The diagrams in Fig. 3 are reproduced from power curves showing the effect of battery regulation at Woonsocket, R. I.

Cast Steel Body Bolsters for Street Cars.

The engraving shows a cast steel body bolster for electric street cars designed and made by Shickle, Harrison & Howard Iron Co., of St. Louis. This design was got up some little time ago, and has been received with considerable favor. The company has lately received an order for a number of these bolsters from the John Stephenson Co., Ltd.

The engraving explains itself. It will be seen that provision is made for carrying the sills very low without interfering with the curving of the truck, which is one of the difficulties in street car practice. The bolster is very simple, and being in one steel casting there is nothing to wear loose or get out of place.

Good Workmanship.

Last January Engineering (London) printed an editorial article under the title "Good Workmanship," which was designed especially as a sermon for English manufacturing engineers, but which has its interest also for Americans, and has been considerably reprinted and commented on. The gist of it is that the American manufacturer of machine tools and engines is more clever than his British rival in expending his energies where they will count; in other words, he finishes very perfectly where finish is useful, and does not finish at all where finish will do no good. It is the old story of getting the most out of a dollar by the application of common sense to the problem. As an illustration, the editor of Engineering says:

"Some time ago we took to pieces one of the small drills driven by compressed air, which are now becoming so common. [The drill referred to was the "Boyer," made by the Chicago Pneumatic Tool Company.] The examination thus made showed this piece of work to be, all things considered, one of the best examples of manufacturing engineering we have ever met with. For roughness of finish, certain of the concealed portions of the tool exceeded anything we had previously experienced, while the finish of the actual working parts was, on the other hand, as near perfection as is commercially possible. The pistons were ground dead true, and fitted their cylinders air-tight, without requiring packing. The valve, which was of the rotating type, was finished in an equally perfect way. In short, throughout no soft packings were used, the moving parts fitting in their seats with such accuracy as to practically prevent all leakage. The gears, used in reducing the speed of the prime spindle to that of the drill spindle, had all cut teeth, and ran most sweetly; still, the filing on the crank cheeks, which fitted nothing, was absolutely the roughest we have ever met with in a finished article. These cheeks were, when the drill was in running order, absolutely concealed from view, and thus labor expended on finishing them would neither have added to the efficiency nor appearance of the tool. Good engineering, therefore, mindful of the fact that tools are built for human use and not for gods with all-piercing eyes, quite rightly reduced to a minimum all labor on these hidden parts."

Saving by Use of Storage Battery.

Lay out with	Cost of generating apparatus.	Cost of storage battery.	Total cost of station plant.	Cost of coal a day.	Cost of coal a year.	Saving in coal.	Saving in coal and saving in int. 5 p. c.	Saving in labor a year.	Saving in water, oil, waste, etc.	Total saving.	Estimated addition to receipts.	Net advantage in operation.
1. No battery.....	$115,000	.....	$115,000	$30	$10,950	.....	.....	.....	.....	.....	.....	.....
2. Small battery.	60,000	$20,000	80,000	25	9,125	$1,825	$3,575	.....	$100	$3,675	.....	$3,675
3. Modium " .	50,000	35,000	85,000	20	7,300	3,650	5,150	.....	200	5,350	$1.000	6,350
4. Large " .	40,000	70,000	110,000	15	5,475	5,475	5,525	$1,200	300	7,025	5,000	12,025

I have assumed $100 per kilowatt as the cost of complete station apparatus without batteries.

In regard to the "small" battery, there is no doubt of its advantages in many cases, but for new installations it is not always the most economical battery. I understand that Mr. Leslie Carter, the President of the South Side Elevated Railroad Co. in Chicago, said recently that, as far as he knew, their battery did not save anything in the cost of operating the road, but that they could not run without it. . . . The battery on this road was put in for regulating purposes only, and the load curves, Fig. 2, give the impression that the battery must certainly be useful. It seems to me hardly worth while in laying out a new station to put in a battery for the purpose of reducing the power curve of the electric road to the characteristics of electric light practice, when by going a few steps further it may be refined to a practice comparable with marine engineering.

It might appear at first thought that a battery of sufficient capacity to insure a full load for the generating units at all times, would save as much fuel as a battery large enough to level off the 24-hour service, but it is very difficult to follow the power requirements from hour to hour in such a way as to make ideal use of a battery, whereas with a "large" battery it would be possible for the ordinary station engineer to adjust his load so as to operate all of his apparatus to the best advantage all the time.

I have carefully analyzed the figures in Mr. Conant's very interesting paper before the Boston meeting of the American Street Railway Association,* and am compelled to differ from him at some points, and refer to them in order to meet in advance any criticism of my paper which may be based on his tables. In the first place, he assumes that his standard station can be worked all the year round with a load factor of 33⅓ per cent., which is entirely too high: 20 or 25 per cent. would be more normal. I suspect that Mr. Conant's load factors have been obtained by indicator cards instead of wattmeters. In Mr. Conant's table none of the stations show a better figure for coal than 3 lbs. per kilowatt hour, while his standard station is put down for 2.2 lbs., without any intimation of the process for attaining such a good result. The question as to how the cost of repairs and depreciation of the entire plant would be affected by a large battery is peculiar. It might be supposed that a mere reservoir which is quickly drained would be of little value compared to a lot of extra generating apparatus standing idle, but experience is demonstrating every day in existing plants, that the reserve which is needed most is the reserve which is not only ready for emergencies, but actually alive to any demand without the direction of a human mind.

Most of what has been said of the storage battery as applied to the power station illustrated by the curves in Fig. 1 is true of its application to railroad power stations in general. The use of water power introduces a factor in the problem more variable than fuel, and I shall not attempt the discussion of it. Alternating currents lend themselves readily to the development of storage battery applications on account of the mutually helpful combination of battery and rotary at sub-stations. Up to the present time, each of the large batteries installed for railroad work has been obliged to meet different conditions and requirements, but they are all serving their respective purposes well, and showing many different fields of usefulness.

Most of us feel that the electric railroads and electric lighting interests are destined to get into closer relations, and the generating station of the future may be required to furnish all the electricity used within large areas for every purpose.

I believe that all the energy supplied by means of electric currents to consumers of every nature in the greater New York should radiate from two or three central stations, and that these should be electrically tied together. The sub-stations would naturally consist of rotaries and storage batteries. It may not be possible to lay out each sub-station so that the rotaries would run at a constant load for 24 hours a day, but it seems to me quite probable that such an arrangement would eventually be reached, and this would, of course, give the generating stations a constant load.

At the present time the load curves of the electric railroads are very uncertain, and peaks are likely to occur at almost any time of day, while the addition of the peak due to electric lighting in the early evening would not add in large proportion to the railroad peak, but electric lighting is capable of more general application, and it is possible that within a few years the distribution in the Borough of Manhattan may reach from three to five hundred thousand kilowatts at the highest part of the lighting curve, which will probably be as great as the rail-

* See Railroad Gazette, Sept. 30 and Oct. 7, 1898.

Another instance which is cited is that of some American inclosed engines, where the connecting rods were not even rough-turned, but simply forged approximately to size. The working parts, however, were most carefully finished. English practice has improved in these matters in recent years; the quantity of bright work about an engine has been a good deal diminished, and along with the reduction in the amount of finished work has come more attention to getting good castings.

The editor sums up by saying that unseen parts should have no more trouble put on them than is necessary to the satisfactory working of the machine. The energy thus saved may well be expended in improving the appearance of the exposed parts by good design and the use of well-finished castings. "Useless work, adding neither to the appearance nor efficiency of the machine or structure, is, in its essence, as immoral as the squanderings of a prodigal." Of course the reply to this is that if the mechanic is allowed to let one part go rough he will be careless of another; but the exigencies of competition have driven the editor of Engineering to lay down a proposition in morals which would be very shocking to Ruskin.

Formulas for Locating Frogs.

By Malverd A. Howe.*

The following method for locating a given frog may be of interest, in that only a very few simple formulas are required for all of the cases which ordinarily occur:

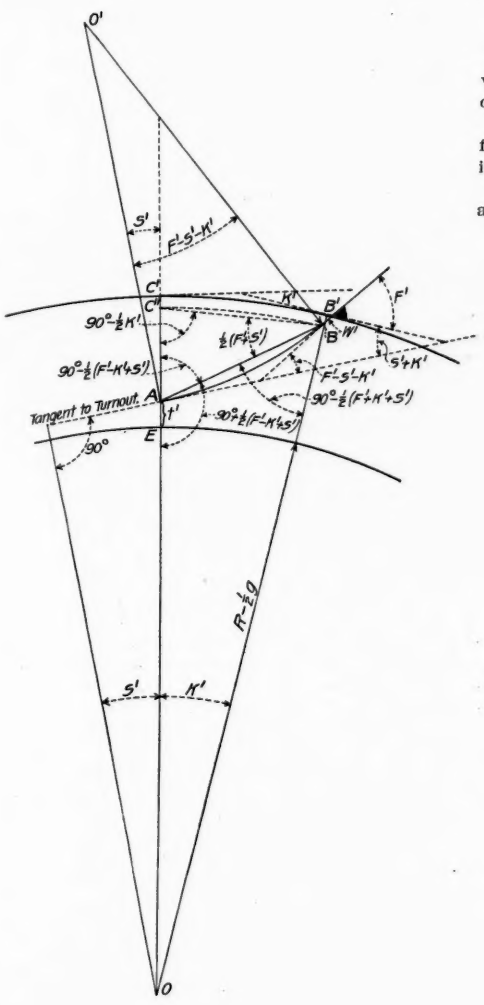


Fig. 1.

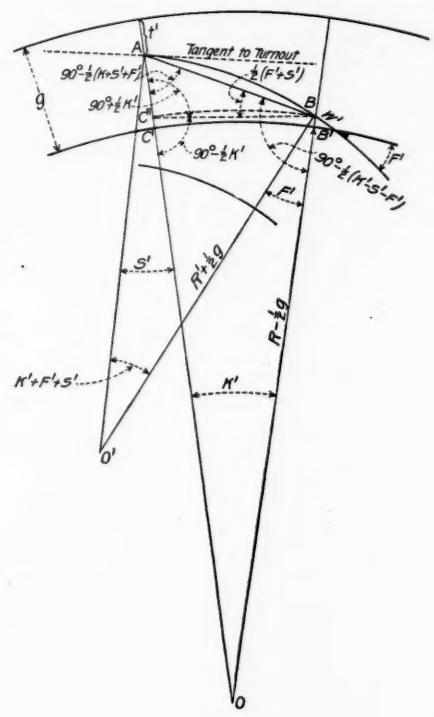


Fig. 2.

Prof. Howe's Methods of Locating a Given Frog.

Let (Figs. 1 and 2),

R = the radius of the center line of the main track.

R^1 = the radius of the center line of the turnout.

g = the gage.

t^1 = the "throw" of the switch rails measured on the radius R.

S^1 = the angle between the tangent to the turnout at A and the tangent to the main track at E.

K^1 = the angle between the radii of the main track which pass through the points A and B, the beginning and end of the turnout curve.

F^1 = the frog angle.

W^1 = length of *straight* wing of frog.

Then (Fig. 1) from the triangle A O B,

$$\tan. \tfrac{1}{2}(O\,A\,B + O\,B\,A) = \frac{O\,B + O\,A}{O\,B - O\,A} \tan. \tfrac{1}{2}(O\,A\,B - O\,B\,A)$$

or,

$$\tan. \tfrac{1}{2} K^1 = \frac{g - t^1 - W^1 \sin. F^1}{(2R + t^1 - W^1 \sin. F^1) \tan. \tfrac{1}{2}(F^1 + S^1)} \quad (1)$$

From Fig. 2,

$$\tan. \tfrac{1}{2} K^1 = \frac{g - t^1 - W^1 \sin. F^1}{(2R - t^1 + W^1 \sin. F^1) \tan. \tfrac{1}{2}(F^1 + S^1)} \quad (2)$$

From the triangle A B C^{11},

$$A\,B = \frac{g - t^1 - W^1 \sin. F^1}{\sin. \tfrac{1}{2}(F^1 + S^1)} \cos. \tfrac{1}{2} K^1 \quad (3)$$

Formula (1) is perfectly general for all cases where the frog is located in the *outer rail of the main track* and formula (2) where it is in the *inner rail of the main track.*

Formula (3) can be applied to all cases. Usually K^1 is so small that its cosine is nearly unity and formula (3) can be used for most cases in practice without a previous application of formulas (1) and (2).

These formulas apply to all forms of switch rails, from the old stub rails to the modern point rails, the angle S^1 being computed for the particular type employed.

If it is desirable to neglect the effect of the straight wing of the frog it is only necessary to drop the terms which contain W^1.

The point of frog can be located by measuring the following distances from C^1 along the rail containing the frog:

In Fig. 1,

$$C^1\,B^1 = \frac{K^1}{57.3}(R + \tfrac{1}{2} g) + W^1 \cos. F^1 \quad (4)$$

In Fig. 2,

$$C^1\,B^1 = \frac{K^1}{57.3}(R - \tfrac{1}{2} g) + W^1 \cos. F^1 \quad (5)$$

From Fig. 1,

$$R^1 + \tfrac{1}{2} g = \frac{A\,B}{2 \sin. \tfrac{1}{2}(F^1 - S^1 - K^1)} \quad (6)$$

From Fig. 2,

$$R^1 + \tfrac{1}{2} g = \frac{A\,B}{2 \sin. \tfrac{1}{2}(F^1 + S^1 + K^1)} \quad (7)$$

The above formulas (1—5), although general, are very simple, and can be readily applied to special cases.

The formulas can easily be applied in running out from the crotch frog in double turnouts, or in crossing from one frog to another in parallel rails.

Fig. 3 illustrates one of many problems where the above formulas can be applied. Here the turnout is through the crotch frog, and we have given AG, EG, K, S, F^1, F, g and R.

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The Industry of Making "Industrials."

In the first two months of this year, certain new companies were created in the United States with an aggregate capital of over $1,100,000,000. These are largely consolidations of old companies and partly the creation of brand new ones. The Commercial and Financial Chronicle, in its last issue, gives a list of these new concerns, and makes some comments thereon, expressing ideas which must have occurred to a good many men. We reprint the table and a short extract from the article which accompanies it in the Chronicle.

That caution is plainly necessary is evident from the magnitude of the capital additions being provided through these various combinations. We present below the statement which we have prepared to show the extent of the new organizations of this kind announced the present year. It should be distinctly understood that the statement covers simply the period since the 1st of January, and is made up on a very conservative basis. We have taken only the combinations which have been actually incorporated, or regarding whose organization there is no doubt. Such as have been merely talked about or suggested are disregarded entirely. We have omitted even combinations that are plainly in prospect, but which have not yet been definitely matured. Thus we have left out the whisky "combine," now nearing completion, with an estimated capital of $128,000,000, the copper combination, with a proposed capital of $100,000,000, the smelters' and refiners' combination with a suggested stock of about $50,000,000, the contemplated consolidation of the bridge building interests, with an estimated capital of $50,000,000, that of the makers of writing, bond, ledger and envelope paper, with a capital of $40,000,000, and several other similar suggested consolidations. Nor have we taken any account of the proposed increase of $35,000,000 in the stock of the American Tobacco Company. Here is the table, as compiled on that basis:

Name of Company.	—Authorized Capital.— Stock.	Bonds.
American Beet Sugar Co.	$20,000,000	
American Brass Co.	20,000,000	
American Car & Foundry Co.	60,000,000	
American Ice Co.	60,000,000	
American Last Co.	3,500,000	
American Radiator Co.	10,000,000	
American Saddle Co. (bicycle saddles)	1,800,000	
American SewerPipe Co.	25,000,000	
American Silk Manufacturing Co.	12,500,000	
American Soda Co	1,000,000	
American Steel & Wire Co. of N. J.	90,000,000	
Borax Consolidated	12,000,000	
Central Union Gas (natural gas concerns)	24,000,000	
Electric Boat Co.	10,000,000	
Electric Co. of America	25,000,000	
Electric Vehicle Transportation Co.	25,000,000	
General Chemical Co.	25,000,000	
Havana Commercial Co. (Cuban tobacco)	20,000,000	
International Air Power Co.	25,000,000	
Kentucky Distilleries & Warehouse Co.	32,000,000	
Maryland Brewing Co.	6,500,000	$7,500,000
National Carbon Co.	10,000,000	
Nat. Enameling & Stamping Co.	30,000,000	
National Salt Co.	10,000,000	
National Steel Co.	59,000,000	
Nat. Tin Plate & Stamped Ware Co.	20,000,000	
National Tube Co.	60,000,000	
New England Dairy Co. (milk companies)	30,000,000	
New York Auto-Truck	10,000,000	
New York Gas & Electric Light, Heat & Power	36,000,000	36,000,000
Pacific American Fisheries Co.	5,000,000	
People's Light & Power Co. of N. J.	20,000,000	
Pittsburg Brewing Co.	13,000,000	6,500,000
Pressel Steel Car Co.	25,000,000	
Royal Baking Powder Co.	20,000,000	
Rubber Goods Manufacturing Co.	50,000,000	
Standard Sardine Co.	5,000,000	
Union Bag & Paper Co.	27,000,000	
United Lighting & Heating (oil lighting interests)	12,000,000	
United Shoe Machinery Co.	25,000,000	
U. S. Cast Iron Pipe & Foundry.	30,000,000	
United States Varnish Co.	36,000,000	
Virginia Iron, Coal & Coke Co.	7,500,000	7,500,000
Grand total	$1,048,800,000	$57,500,000

It thus appears that in the two months of this year there have been definitely formed new combinations having an authorized capital of $1,048,800,000 of stock, with $57,500,000 of bonds, making $1,106,300,000 for the two months. This is in addition to the $916,176,000 reported for the calendar year 1898, as shown in our issue of Jan. 7, 1899. It is proper to say that the table above includes two companies which were also included in our previous exhibit, but for very much smaller amounts then—namely, the American Steel & Wire Company, and the New York Gas & Electric Light, Heat & Power Company, the scope and capital of these two consolidations having been very greatly enlarged the present year. Nevertheless, the total of $916,176,000 may be regarded as substantially unchanged, for though the two companies referred to have been transferred to the 1899 list, the capital of several other companies remaining in the 1898 column, it turns out, must now be placed much larger than we originally put them—American Potteries, for instance, $40,000,000, against $27,000,000, and Union Tobacco, $24,000,000, against only $10,000,000. It is correct, therefore, to say that the $1,106,300,000 of new capitalizations for the present year are in addition to the $916,176,000 for the calendar year 1898, making over two thousand million dollars together. But the $1,106,300,000 covers only two months, and hence this movement is now proceeding at the rate of six thousand million dollars a year. Totals of such magnitude carry their own comment, and it is unnecessary to say anything to add to their force and significance.

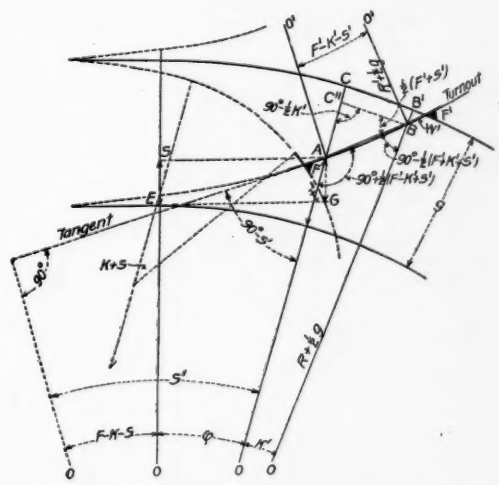


Fig. 3.—Turnout Through Crotch Frog.

The Jungfrau Railroad.

The first section of the Jungfrau Railroad was opened for operation in the summer of 1898. It will be remembered that this is intended to unite Lauterbrünnen with the summit of the Jungfrau, which latter is 4,166 meters above the sea. The length of this railroad is about 12 kilometers, and it is divided into five sections of unequal length. The difference of level between the point of departure and the summit is 2,102 meters. The first section, of 2 kilometers, is entirely in the open air, except for one short tunnel of 84 meters. The difference of level between the two ends of this section is 257 meters, and the maximum grade is 20 per cent. This section was opened Sept. 21.

The second section, also 2 kilometers, has a maximum grade of 25 per cent., and in this section begins the tunnel, which will be followed continuously to the summit of the mountain. In this 2 kilometers the difference of level overcome is 491 meters. The station at the top of this section, namely, Grindelwaldblick, will be dug in the rock by an enlargement of the tunnel. The station will be lighted and heated by electricity.

The third section is from Grindelwaldblick to Kalifirn. This is about 2 kilometers long also. The grade is 25 per cent., and the difference of level overcome 458 meters.

The fourth section, from Kalifirn to the Col de Jungfrau, has a grade of only about 6¼ per cent. and will be worked by adhesion alone. This section is about 3,500 meters long. The difference of level overcome in this section is 123 meters. At this station there will be two galleries, driven perpendicularly to the tunnel, carried to the surface of the slope, and giving views toward the north and toward the south.

The fifth and last section, which begins at this station, takes the tourist to within 73 meters of the actual summit of the mountain, which summit is reached finally by a vertical lift. The length of this fifth section is 3 kilometers, and the grade 25 per cent.

The tunnel has a total length of 10 kilometers and width of 3.6 meters, and a height of 4.25. The section is 14 square meters. The roof is a semi-circular arch. The work of piercing the tunnel in the second section of the road is begun. In fact, about 1,200 meters has been excavated. The drills are driven by electricity, using a three-phase current. These drills, which are rotary, were made at the Oerliken Works and advance two millimeters with each revolution. They make a meter in 12 and 15 minutes in the rock in which they have worked. Percussion drills are also now being tried, made by the Union Electric Gesellschaft, of Berlin. The ventilation of the tunnel during the working is by a Solzer ventilator, also driven by electricity. The main air tube is of zinc, 3 decimeters in diameter. It was decided to carry on the tunnel work during the winter, which necessitated building good barracks for the workmen, as pretty cold weather is experienced there.

The line is to be built to meter gage. The maximum grade is 25 per cent., and the sharpest curvature of 100 meters radius. The trains as now designed will be made up of one electric locomotive weighing about 12 tons and two cars seating 80 passengers. The total weight of the train loaded will be 26 tons. The heavy grades will be worked by rack rail.

A quite complete description of the railroad, its track and its rolling equipment, will be found in Revue Générale des Chemins de Fer for January.

Air Supply and Demand in Freight Service.

A committee of the Northwest Railway Club, consisting of Messrs. F. B. Farmer, G. R. Parker and J. Casey, reported at the January meeting on the above named subject. The report had principally to do with the waste of air from the air brake system of freight trains, arising from leaks and the lack of maintenance of the apparatus; the consequent extra duty required of the air pumps was also considered.

It was first pointed out that as the maximum efficiency of the air brake depends upon the maintenance of a pre-determined pressure in the system, any failure to maintain this pressure results in a proportionate loss of the benefits from the brakes, both in handling trains quickly and in providing safety for moving trains. A lack of maintenance of the brakes also results in more failures, slid wheels and a waste of coal in compressing the excessive amount of air needed.

Some statistics were presented showing how the train pipe pressure is being maintained on roads in the Northwest, where, on account of the severe winter, the conditions are the least favorable to the proper maintenance of the brakes. The records given in the following table were taken on three such roads, where the percentage of air brake cars to the total cars in the trains was, respectively, 59.3, 67.4 and 93.3.

The air pumps in this table were reported to be in good condition, excepting in two or three cases where they were said to be in "fair" condition. But four trains were reported as having leaky train pipes, although with several the standard train pipe pressure could not be obtained. The committee concluded that the train pipes reported as tight really leaked, or they were supplied by pumps in bad order or by pumps of insufficient size.

Train Pipe Pressures on Three Northwestern Roads.

No. cars in train.	No. cars with air brakes.	Air pump. Size, in.	Air pump. Strokes per min. to maintain test pressure.	Pressure when tested, lbs.	Minutes to get pressure.	Pressure on trip, lbs.	Condition of train pipe.
19	10	6	110	70	13	70	Tight.
14	14	6	120	70	14	70	Tight.
28	15	6	130	..	..	68	Tight.
30	16	6	170	70	18	70	Medium.
20	18	6	160	70	7	70	Tight.
50	39	6	160	65	20	60	Tight. (See Note 1.)
22	4	8	184	70	..	..	Tight.
42	6	8	132	70	2½	70	Tight.
18	8	8	126	70	3½	70	Tight.
23	13	8	130	70	13	70	Tight.
20	14	8	180	70	5	70	Tight.
27	18	8	190	70	12	70	Tight.
23	19	8	180	70	8	70	Tight.
28	19	8	180	50	8½	70	Tight.
30	20	8	190	70	5	70	Tight.
39	21	8	198	70	15	70	Tight.
49	24	8	200	70	15	70	Medium.
51	29	8	180	50	15	70	Medium.
47	32	8	180	60	25	..	Tight.
34	32	8	141	70	40	70	.....
35	33	8	60	70	11½	70	Extra Tight.
43	34	8	140	68	22	58	Tight.
43	35	8	98	50	12	60	Tight. Temp. 28°.
60	38	8	164	68	15	60	Tight.
45	43	8	105	40	39	55	Medium.
45	43	8	144	50	35	55	Medium.
49	44	8	186	40	22	60	Medium.
55	55	8	68	42	45	70	Bad leak stopped.
60	57	8	84	50	39	50	Leaky.
21	14	9½	90	70	12	70	.....
26	18	9½	150	70	7	70	Medium.
46	21	9½	150	60	4½	70	Medium.
38	23	9½	128	70	5	70	Tight.
29	22	9½	190	70	15	70	Leaky.
35	25	9½	144	70	28	70	.....
49	39	9½	66	70	20	70	Tight. (See Note 2.)
46	45	9½	144	70	20	70	Medium.
60	52	9½	164	70	30	70	Leaky. (See Note 3.)

Note 1.—The fifty car train with 39 air brake cars was pumped up and recharged by both pumps, two engines being on the train.

Note 2.—The 49 car train with 39 air brake cars required a speed of pump of 66 strokes per minute to maintain the pressure at the standard. While it was intended to have the speed shown only under these conditions, many enginemen misunderstood and took the speed while pumping up. The speeds of 68 and 84 are believed to be erroneous, and that the actual speeds were about three times greater.

Note 3.—The last train given required but 22 minutes to pump up. The time given in each case is not necessarily that required to get 70 lbs. pressure, but the time had before testing.

It is stated that the pumps beside supplying air for the brake system were often required to furnish air for sanding the track, operating bell ringers, flangers, blow-off cocks and the separate exhaust of one type of compound locomotive. Of these, the sanding device was thought to be the most extravagant of air, the bell ringer coming next, and the others not drawing so heavily on the air supply when in good order, which condition, however, does not always exist.

Even without considering these devices there was often more leakage in the brake system than could be supplied by the pump. The most common leaks were found to be caused by the escape of air past the coupling packing rings, at pipe unions, under hose clamps or through the hose and at the triple valves. While not a constant drain, yet brake cylinder leakage increases the amount of air required for recharging. The new Westinghouse dummy coupling is thought to be effective in reducing the first class of leaks, as the packing rings are kept pressed back in place; such leaks are principally caused by the packing rings being distorted, either by bent couplings or by pulling the couplings apart. Often leaks at couplings which are passed if tested with 40 lbs. pressure, will be readily detected if the train pipe pressure is 70 lbs. A test made by the committee of a hose coupling, the leak in which was such as would be passed daily as of little consequence, showed that with a pressure of 45 lbs. the leakage amounted to 133 cu. in. per minute, at 70 lbs. pressure 210 cu. in., and at 110 lbs. pressure the leakage was 294 cu. in. per minute.

An argument was presented in favor of terminal air brake testing plants and reference was made to the plant of the Lake Shore & Michigan Southern at Buffalo, N. Y. The committee said: "Several similar plants are badly needed in this vicinity; for while many repair tracks are provided with facilities for testing, we know of no place where similar provisions exist for made-up trains. Such plants should have an ample compressor capacity with large storage volume and piping to reach all outgoing trains. As soon as a train is made up the fact could be indicated to the inspectors by either a visual or audible signal, so they could have the longest train charged to or above standard pressure in from 3 to 5 minutes after the connections are made. Then, leaks that are now, because of low pressure, either inaudible or thought slight would be shown in their true importance and be remedied. Leaks having been stopped, the brakes could be tested and left set, the only additional duty required of the outgoing engine being to release them. As it is at present the train crew must usually wait for the inspectors or the inspectors for the engine. Then, after the engine is coupled to a long air brake train (the train of the future and the one that gives the trouble now), even with the pump raced the time of charging is long and the dispatcher hurries, with the general result that a farce of a test or none at all is made.

"Certainly a good plant costs considerable, but so does coal, pump repairs, stuck brakes, flat wheels, train delays and wrecks. Such a plant will not prevent all these, but it will certainly so reduce them as to pay a good interest on the investment. The brakes require an occasional thorough inspection and test, followed by the making of indicated repairs. The only way to accomplish this without excessive train delays is by means of the test plants recommended."

Attention was also called to the usual neglect of retaining valves, which causes roads with heavy grades much trouble, and makes necessary the use of more air in braking on grades than would be needed if this part of the apparatus were kept in order. The brake pipes also are often insecurely fastened to the car and leakage occurs at joints on account of the lengthwise movement of the pipes. Leaks also occur at the angle cocks because of imperfect vertical location of the pipes, allowing insufficient clearance between the pipes and the deadwoods. It was suggested that these pipes should be located with reference to the centre line of the draw bar, rather than placed a fixed distance from the rails and regardless of the height of the car.

The committee rather discouraged the practice of fitting cars with pipes only and said: "It is to be particularly regretted that we see being introduced this source of leakage and space to be filled that gives no return in braking force.

Large air pumps were recommended for locomotives and stationary compressors for testing plants at terminals on the score of economy. Where "double headers" are run for considerable distances a separate main reservoir pipe run forward and back on the left side of the engine, and with signal hose couplings, is considered of great value in giving the forward engineman the use of both pumps and the main reservoirs. At least two roads which are now replacing small pumps with larger ones have put two small pumps on one locomotive, both of which are supplied through a single throttle, oiled by one lubricator and controlled by one large governor. In this way one-half the number of small pumps can at once be displaced by large ones. The committee also recommended methods for testing air pumps to determine whether they were compressing air up to their rated capacities.

It seems to be very clearly shown that under severe conditions in freight train service the air supply is deficient for the proper working of the brakes and that this supply should be increased by the use of large pumps, while at the same time the demand for air should be decreased by stopping the leaks.

English Railroads in the Last Half Year.

The active condition of many industries yielded a largely increased volume of traffic, and the gain in gross revenue during the last six months was even larger than in either of the two preceding half-years. But increased working expenses and prior charges swallowed up more than the whole of the gain in gross receipts, and in the aggregate the balance available for dividend on the ordinary stocks was less than that for the last six months of 1897. Thus the actual amount paid in ordinary dividends by 15 companies was £7,292,396, while the sum distributed at the corresponding period last year on a considerably smaller amount of ordinary capital was £7,354,455. The average dividend, therefore, works out at $6\frac{1}{16}$ per cent., as compared with 6¼ per cent. for the last half of 1897.

Taking the accounts of the companies in detail, the results are less unsatisfactory than might appear from a consideration of aggregate figures only, owing to the exceptionally unfortunate record of the Great Western Company, and to a smaller extent of the Great Central and London & South-Western. Although the working expenses increased to a large actual amount, and their proportion to gross revenue was higher than in the corresponding period, yet there was a fairly substantial sum remaining to swell the net revenue, whereas, last year the expenditures absorbed more than was gained in gross revenue. Only in the case of the Great Western was there any considerable falling off in net revenue, and out of the fifteen companies five were able to increase their ordinary dividends and four made reduced distributions, the remaining six paying at the same rate as last year.

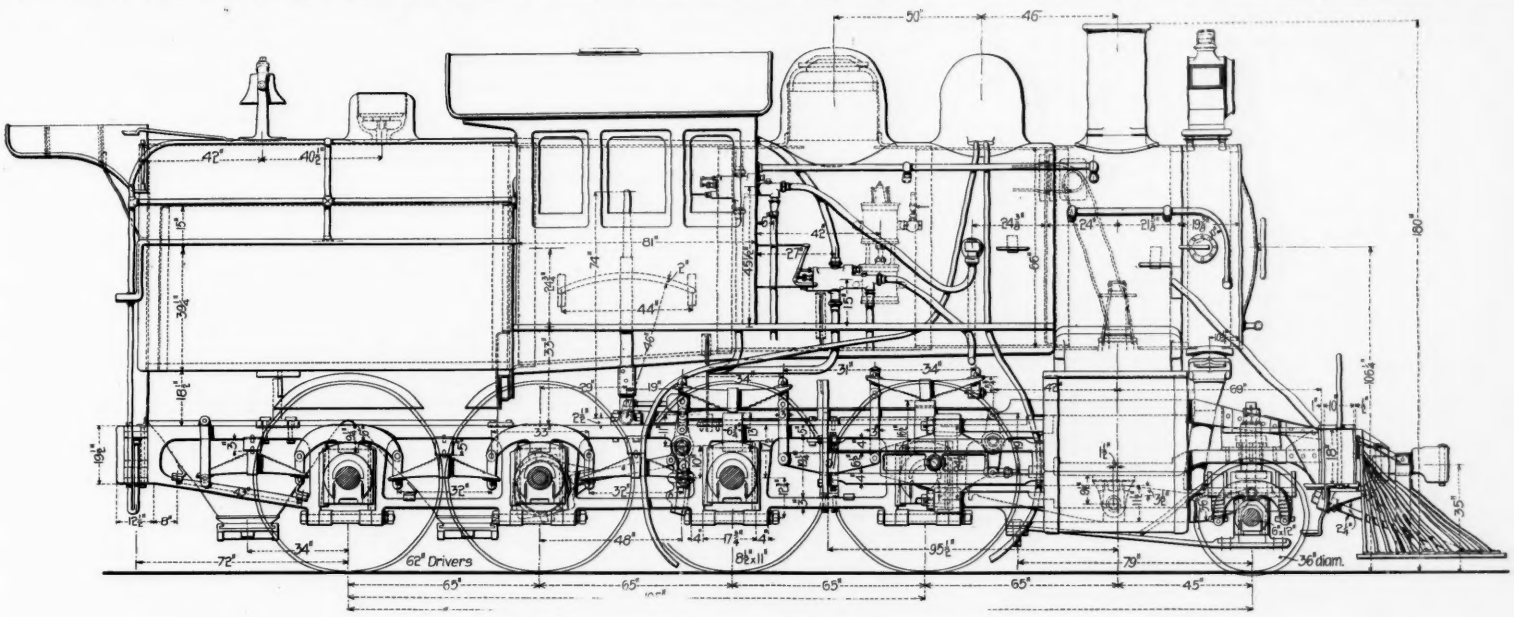
The two main branches of traffic contributed the bulk of the increase in gross receipts and it is worthy of note that the expansion in the passenger receipts—the most profitable source of revenue—was the largest, both in actual amount and in pro-

portion to the total receipts. The increase of £704,600 in that branch is equal to 4.1 per cent., and the gain of £408,800 in merchandise to 3.7 per cent.—The Economist.

Consolidation Locomotive with Large Drivers for the Lehigh Valley Railroad.

In our issues of Nov. 25 and Jan. 13, we illustrated a heavy consolidation locomotive of the Lehigh Valley used as a pusher on the mountain cut-off east of Wilkesbarre, which was notable for its great weight and boiler capacity, and we now show an elevation and sections of a somewhat lighter consolidation designed by Mr. S. Higgins, Superintendent of Motive Power, which is also a departure from usual practice. Two engines of this design have just been ordered from the Baldwin Locomotive Works, one with single expansion and the other with compound cylinders of the Vauclain type; in all other respects they will be identical. The drawings shown are those for the compound, which will have cylinders 17 and 28 in. by 30 in., while 21 in. x 30 in. cylinders will be used with the simple engine.

If these locomotives are found to meet the requirements, 24 more will be ordered for use in heavy freight service betwen Buffalo and Sayre. On this section there are some long grades, 20 ft. to the mile, and it is proposed to haul with the new locomotives, trains of 2,000 net tons, excluding the weight of the engine and tender; at present these trains are hauled by two small locomotives, and it is expected to do away with double headers.



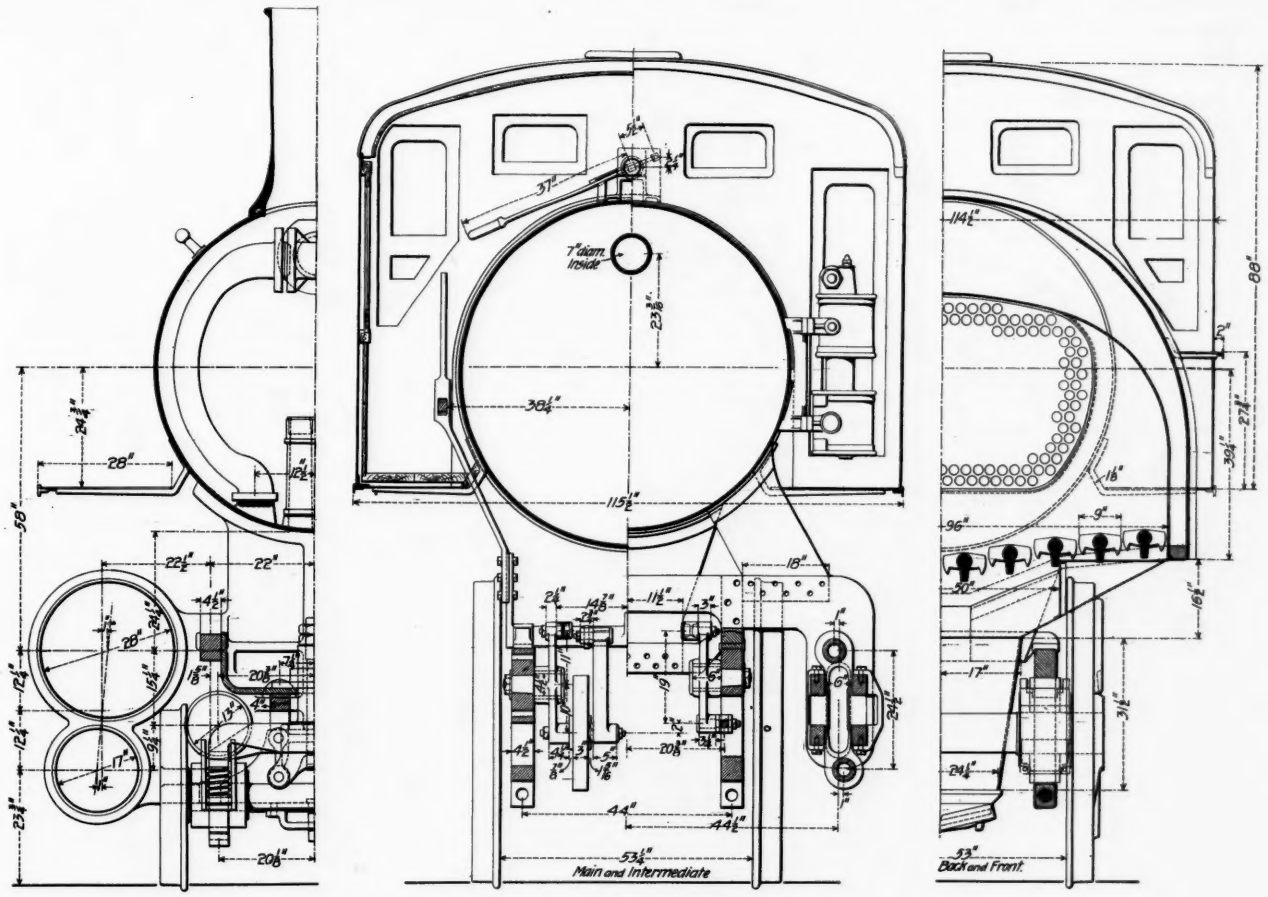
Lehigh Valley Consolidation Locomotive with 62-Inch Drivers.

The boiler is of the wide firebox type designed for a steam pressure of 200 lbs., has an outside diameter of 66 in. at the front and contains 300 tubes, 2 in. in diameter by 15 ft. 1 in. long; attention is called to the unusual length of the tubes. The front end it will be noticed is quite short. Anthracite coal will be used with these locomotives.

The driving wheels all have flanges, are 62 in. in diameter, and are said to be the largest ever used with a consolidation locomotive; 58-in. drivers are the largest that our records show. These large wheels result in a long wheel base, the total being 25 ft. 5 in., and the driving wheel base 16 ft. 3 in. The gage of the front and back pairs of drivers is made ¼ in. less than that of the main and intermediate ones.

It will be seen from the cross-sections that the center lines of the high and low-pressure cylinders do not lie in a vertical plane, but that the low-pressure cylinders are moved in to keep within the prescribed clearance lines. This arrangement necessarily gives rise to a moment at the crosshead tending to bring unequal pressures upon the guides, but this is provided for by the use of heavy four-bar guides with wide vertical bearing surfaces. The piston rods are hollow, and of nickel steel, the outside diameter being 4½ in. and the inner diameter 3 in. Piston valves 13 in. in diameter are used.

The tenders will have sufficient capacity for 4,500 gals. of water, and will be equipped with Westinghouse air brakes, while the American-Westinghouse brake will be used for the driving wheels.



The Latest Lehigh Valley Consolidation Locomotive.

Cast Iron

By Dr. R. Moldenke.*

The recent tests of cast iron columns, made under the auspices of the Building Department of New York, brought out very forcibly our comparative lack of knowledge and skill in handling a material which should be peculiarly well adapted for this class of work. The practical condemnation of cast iron for even the simplest of structural members under stress, is the natural consequence of the uncertainty existing in the mind of the engineer and founder regarding the interior condition of an otherwise good looking casting. But for the manifest advantages of a material which can be cast into any conceivable shape readily and with a fair chance of success, where would a factor of safety of 20 be tolerated? We are hardly ready to accept machinery built of structural steel, as long as the superior stiffness of heavy cast iron frames and beds is not counterbalanced by too great a cost. This, moreover, in spite of the fact that we have to reckon heavily with the internal strains and consequent warping tendencies of large castings in machine design and construction. The modern tendency is to raise the elastic limit of the materials we work with, in order that a saving in weight may be effected. Thus cast

(*Continued on page 174.*)

*Consulting Metallurgist with the McConway & Torley Co. Extracts from a paper read at the November meeting of the Engineers' Society of Western Pennsylvania.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
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Lumber Production and Prosperity.

The demand for materials for construction is perhaps the best index to the prosperity of the country. When men have profits they build houses, extend factories, make new railroads, etc.; when they find it hard to make both ends meet such work is suspended so far as possible. Thus one of the first signs of "good times" is likely to be an increased output of lumber, brick, stone, lime, iron, etc. We have quite complete statistics of iron production and very important statistics of lumber production. The chief of the latter is the statistics of the production of white pine in the American territory about the Great Lakes, published annually by the American Lumberman (formerly the Northwestern Lumberman), which we have reviewed frequently.

It is interesting to recall that after the panic of 1873 the white pine production fell off 10 per cent. by 1877; that with the return of prosperity it increased no less than 33 per cent. from 1878 to 1879, and went on increasing at a rapid rate until 1884, when it was more than twice as great as in 1878, having been, in millions of feet:

1878.	1879.	1880.	1881.	1882.	1883.	1884.
3,629	4,807	5,651	6,769	7,552	7,625	7,935

The production in 1884 was the largest until 1888, and then for five years it averaged 8,400 millions, culminating with 8,854 in 1892. The industrial paralysis beginning with 1893 was marked by a decrease to 7,326 millions in that year, which, however, does not adequately represent the stagnation, for the increase in the stocks on hand showed that only 6,907 millions were marketed in 1893.

The return of prosperity in 1898, in many respects comparable to that in 1880, is but feebly reflected in the lumber production, or, to speak more accurately, in the white pine production. The Lumberman's figures show for the past seven years, in millions of feet:

1892.	1893.	1894.	1895.	1896.	1897.	1898.
8,594	7,326	6,822	7,051	5,726	6,233	6,155

Thus, with the exception of 1896, last year's production is the smallest since 1880. The relation of this industry to construction is better shown by the amounts marketed, for usually the mills have more than one-half of the whole year's cut in stock at the end of December. The statistics of the stocks on hand have not been kept so long as the others, but for the last six years they show that the amount of lumber marketed by the mills has been:

1893.	1894.	1895.	1896.	1897.	1898.
6,907	6,790	6,816	5,861	6,471	6,476

Thus the white pine marketed, which approximates the consumption, seems to have been about the same last year as in 1897, and less than in any other recent year except 1896, when business was most stagnant. As the farming country immediately west and southwest of the lumber country was the first to recover from the hard times, and has unquestionably been much more prosperous for the last two years than for several years before, this condition of the lumber trade needs explanation to those not familiar with the circumstances.

The production and consumption of white pine has increased little, because the supply of trees is becoming exhausted. Probably no increase in demand, represented by high prices, would make it possible to equal the production of 1892, and certainly that rate of production could be maintained but a very short time. The fact is, this branch of lumber production no longer has its old significance as an index to the prosperity of the country. An increase in the construction of buildings, fences, etc., in the upper Mississippi Valley no longer means necessarily an increase in the consumption of white pine lumber. That remains by far the most important lumber, but it is supplemented by hard pine from the south, hardwood from everywhere, and hemlock, etc., from the white pine country itself, the latter till recently thought not to be worth cutting. It is noticeable that the production of shingles has not decreased like that of lumber, and has greatly increased since 1896; and the cut of hemlock has become so important of late years (cut in white pine mills), that the American Lumberman has begun to keep a record of it, and it amounted to the respectable figure of 608 millions last year, 41 per cent. more than in 1897, and nearly one-tenth of the white pine production.

There are, however, indications that the aggregate demand for lumber and the amount of new construction have not increased so much as Wall Street bulls would lead us to suppose. Prices have not risen greatly, and trade, except perhaps in Southern pine, is, though apparently satisfactory, not particularly active. It is to be remembered that some places, and Chicago most of all, overbuilt in 1893 and before, while in New York the construction of buildings was active throughout the hard times. It is perhaps to the very moderate increase in activity in the construction of buildings and railroads that the abundance of capital is due which is seeking investment on the exchanges. New construction is the great absorber of capital under ordinary circumstances; but so far the activity in that direction seems to be nothing like what it was after 1879.

Congress and the Nicaragua Canal.

The outcome in the Nicaragua Canal matter before Congress could hardly have been better. The final action of the Fifty-fifth Congress was exactly what we have wished and urged. By an amendment to the river and harbor bill the President is authorized to make a full investigation of the subject of a canal across the Isthmus and to employ for that purpose engineers from the army or from civil life, or any other persons, and to fix their compensation, and the very liberal sum of one million dollars is appropriated for the investigation. The text of this paragraph as enacted follows in full:

> That the President of the United States of America be and he is hereby authorized and empowered to make full and complete investigation of the Isthmus of Panama with a view to the constructing of a canal by the United States across the same, to connect the Atlantic and Pacific oceans; that the President is authorized to make investigation of any and all practicable routes for a canal cross said Isthmus of Panama, and particularly to investigate the two routes known respectively as the Nicaragua route and the Panama route, with a view to determining the most practicable and feasible route for such canal, together with the approximate and probable cost of constructing the canal at each of two or more of said routes. And the President is further authorized to investigate and ascertain what rights, privileges and franchises, if any, may be held and owned by any corporation, association or individuals, and what work, if any, has been done by such corporations, associations or individuals in the construction of a canal at either or any of said routes, and particularly the so-called Nicaragua and Panama routes respectively, and likewise to ascertain the cost of purchasing all of the rights, privileges and franchises held and owned by any such corporations, associations and individuals in any and all of such routes, particularly the said Nicaragua route and the said Panama route, and likewise to ascertain the probable or approximate cost of constructing a suitable harbor at each of the termini of said canal, with the probable cost of maintenance of said harbors respectively, and generally, the President is authorized to make such full and complete investigation as to determine the most feasible and practicable route across said isthmus for a canal, together with the cost of constructing the same and placing the same under the control, management and ownership of the United States.
>
> To enable the President to make the investigations and ascertainments herein provided for, he is hereby authorized to employ in said service any of the engineers of the United States Army and from civil life, at his discretion, and any other persons necessary to make such investigation and to fix their compensation.
>
> For the purpose of defraying the expenses of the investigation $1,000,000 is appropriated. The President is requested to report to Congress the result of such investigations, together with his recommendations in the premises.

Whether this one million dollars is wasted or not depends on the President. He has a free hand in the matter. He can appoint men to this work who will do it thoroughly and well and whose character and attainments will command the confidence of all their countrymen and whose labors will add to the glory of his administration. Or, he may appoint men who will be laughed at and whose report will be without value in the opinion of all well-informed and discriminating men. The questions before this commission will be of the first magnitude, and the men who decide them must, if their decision is worth anything, be of the first order.

The time within which the report to Congress must be made does not appear to be fixed by the Act, although the newspapers have said that the report must be made at the opening of the next session of Congress. What authority there is for this assumption we do not know. Fortunately, the New Panama Canal Company can put before the commission all the information that it will need to decide the engineering questions of the Panama Canal, and perhaps the reports of the Ludlow and the Walker commissions will be enough for the engineering side of the Nicaragua Canal. Of that we cannot judge until the final report of the Walker Commission is made. The commercial questions cannot, in the nature of things, be conclusively settled. What a man thinks about them must be largely a matter of his surroundings and temperament. It is impossible in this case to reason from what is past or from what exists to what may happen in the future.

We should like the privilege of selecting this commission and laying out its work, but we judge that the President is not likely to call upon us for assistance in the matter. Our scheme would be to put the whole work into the hands of one man, and make him responsible for the investigation and the report. He would be paid enough money to command all of his time until his work is done, and he would select and be responsible for all of the men necessary to assist him. In that way we should get the undivided thought and work of one of the best men in America, and he would have the glory of success or the odium of failure, and with these facts before him he would give to the country the best that he could.

It is not for a moment to be assumed that any one man has the judgment and knowledge to pass upon the different great questions that arise in this canal matter, but a man of wisdom and experience could select the right men to help him, and with the liberal fund at his command he could get the best men in the country.

The country owes a great debt to a few resolute and patriotic men in the House of Representatives. Tremendous efforts were made to sled through some measure which would immediately commit the country to a great expenditure for the Nicaragua Canal. As one device after another was defeated, largely through the wisdom and firmness of the Speaker of the House of Representatives, the Senate was finally brought down to an amendment to the River and Harbor bill, appropriating five million dollars with which to begin the construction of the Nicaragua Canal. It would be hard to find anything more childish than such a proposition. Five million dollars would be simply thrown away, so far as the nation is concerned. Fortunately, this last device to get something out of the Treasury was defeated, and the paragraph which we print above was substituted for it.

Train Accidents in 1898.

The record of train accidents in the United States during the year 1898, which has been published in monthly installments, and which is summarized in the two large tables given herewith, shows a marked increase in the total number of accidents to moving trains over the last preceding three years, as was to be expected in view of the large increase in the amount of business done by the railroads of the country; but the record of deaths and injuries is much more favorable.

The number of passengers killed, 46, is the smallest annual total, except that of 1895, since the records of passengers separate from employees were begun; and it is very much smaller than the total in any year except 1894 and 1895. From January 1894, to July, 1896, no great passenger train disaster was recorded, and there was no unusual disaster in 1898. The increased safety of passengers and employees was noticed in our annual review a year ago. In our record for the month of February, 1898 (page 219) we compared the three winter months, ending with February, with the three winter months of the year before, and showed that the ratio of casualties to accidents, and the number of

casualties per day, had increased far less rapidly than had the number of accidents. A statement of the number killed per train mile, if it could be made, would be no less gratifying, for both in this three-months comparison, and in the annual comparisons which we now make, there would be a marked increase in train mileage.

record, the average number of persons killed reached the lowest point in our record, only 0.6 per day; per accident the average was 0.14.

The information given in the large table published herewith covers the same ground as in previous years, and the table is self-explanatory. We may repeat that the record is in no sense official, unusual or obscure. The classification of the accidents in the table is somewhat arbitrary, accidents which are due to two or more causes being shown under the head only of the more prominent cause.

Though the introduction of the block system, the extension of the use of air brakes, improvements in discipline and in construction of track, cars and engines have reduced the risk to life and limb, the lessons to be derived from the train accident record are no less instructive than those of former years. One of the important lessons, and one which is frequently repeated, is that of the value of stout platforms and vestibules in fast passenger trains. These features we have not been able to dwell upon in detail, except in one or two cases, but there can be no doubt that many lives have been saved by them. Various lessons on the advantage of the space interval over the time interval method of running trains have been set forth in our monthly articles (January, April, July, November and December).

TABLE NO. 1.—TRAIN ACCIDENTS—THEIR NATURE AND CAUSES, FOR TWENTY-SIX YEARS.

	1898.	1897.	1896.	1895.	1894.	1893.	1892	1891	1890.	1889.	1888.	1883-87. †	1878-82. †	1873-77. †
TRAIN MILEAGE in United States in millions of train miles*	900.0	858.0	850.7	834.2	818 4	889.4	864 9	831 2	793 9	722.0	688.8	.....	.....	.....
COLLISIONS:														
Rear	473	355	228	301	280	455	485	555	495	379	404	342	273	150
Butting	232	158	129	109	134	223	251	284	323	260	311	174	121	96
Crossing and miscellaneous	307	218	157	192	199	318	326	298	223	110	89	32	21	44
Total collisions	1.012	731	514	602	613	996	1, 62	1,137	1,041	749	801	548	417	295
DERAILMENTS:														
Broken rail	19	25	26	4	32	71	68	53	38	32	61	68	48	71
Loose or spread rail	26	23	16	16	35	57	53	68	44	28	42	66	34	31
Broken bridge or trestle	21	26	19	16	23	20	30	42	38	42	40	32	27	24
Broken or defect ve switch	17	13	9	9	16	41	26	38	33	1	29	13	3	9
Broken or defective frog	6	8	3	5	5	16	11	11	12	7	16	11	2	5
Other defects of road	5	6	5	8	3	9	8	2	2	1	1	1	2	9
Total defects of road	94	101	78	95	114	214	191	214	167	120	189	191	116	149
Broken wheel	51	42	42	33	33	48	46	39	37	28	48	33	28	22
Broken axle	113	77	74	70	71	88	56	66	59	48	44	49	36	32
Broken truck	36	30	24	20	18	31	28	38	25	20	27	15	11	10
Failure of coupling or drawbar	28	28	16	17	27	29	27	20	7	5	7	4	1	4
Fall of brakebeam	14	14	9	14	10	19	23	27	12	9	9	5	.....	3
Other defects of equipment	28	23	23	23	26	26	25	18	10	13	2	3	3	5
Total defects of equipment	270	214	188	177	182	241	206	215	158	120	145	108	79	76
Misplaced switch	42	39	28	48	53	67	98	78	54	54	70	69	77	76
Derailing switch	13	9	5	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Negligence of trackmen or bridgemen	8	4	2	8	6	11	5	16	8	10	3	5	5	9
Runaway engine or train	16	14	5	8	1	4	1	9	19	8	14	2	2	2
Open draw	2	6	2	3	4	4	3	3	5	1	4	4	3	4
Other negligence	25	19	23	17	39	48	57	38	22	19	26	5	4	6
Total negligence in operating	106	91	66	91	103	137	164	144	108	92	117	84	91	97
Animals on track	25	23	24	21	38	59	51	61	56	41	57	33	39	48
Snow or ice	10	8	9	16	12	16	7	6	6	5	22	17	13	20
Washout	9	24	23	17	5	16	19	19	18	20	19	21	21	28
Landslide	17	20	29	25	31	27	30	28	28	24	34	16	7	6
Accidental obstruction	19	21	26	33	19	32	29	20	28	8	20	32	32	38
Malicious obstruction	9	18	28	40	62	51	35	53	45	25	36	30	13	15
Other unforeseen obstructions	8	3	7	2	11	5	8	5	13	8	5	8	3	3
Total unforeseen obstructions	97	114	146	154	178	197	179	192	194	131	193	157	128	158
Others	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	5
Unexplained	577	353	314	293	296	423	425	439	377	296	385	184	231	224
Total derailments	1 144	873	792	810	873	1,212	1,165	1,204	1,004	759	1,032	723	646	709
ACCIDENTS WITHOUT COLLISION OR DERAILMENT:														
Boiler explosions	19	11	15	12	9	24	19	19	21	13	15	15	14	10
Broken parallel or connecting rod	8	12	6	10	12	8	10	8	9	5	22	22	14	10
Cars burned while running	10	14	4	17	16	18	13	19	15	4	7	10	8	9
Various breakages of rolling stock	16	3	12	8	10	18	20	28	27	21	22	21	9	16
Other causes	19	17	14	28	27	31	38	29	29	18	33	8	1	6
Total without collision or derailment	72	54	51	75	74	99	100	103	101	61	99	76	46	51

RECAPITULATION.

Collisions	1,012	731	514	602	613	996	1,062	1.137	1,041	749	801	548	417	295
Derailments	1,144	873	792	810	873	1,212	1.165	1,204	1,004	759	1,032	723	646	709
Other accidents	72	54	51	75	74	99	100	103	101	61	99	76	46	51
Total	2,228	1,658	1,357	1,487	1,560	2,307	2,327	2 441	2,146	1,539	1,935	1,347	1,100	1,055

* Train mileage is taken from Poor's Manual, which gives revenue mileage only; that for 1898 is estimated.
† Average per year, for five years.

TABLE NO. 2.—CASUALTIES TO PASSENGERS AND EMPLOYEES IN TRAIN ACCIDENTS IN 1898.

Tabulated according to classes of causes.

Month.	Defects of road.				Defects of equipment.				Negligence in operating.				Unforeseen obstructions and maliciousness				Unexplained.				Total.			
	Pass.		Emp.		Pass		Emp.		Pass		Emp.		Pass.		Emp.		Pass.		Emp.		Pass.		Emp.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed	Injured.	Killed.	Injured.	Killed.	Injured.
January	0	4	2	2	0	1	4	12	2	19	21	73	0	17	3	4	4	31	9	14	6	77	39	105
February	1	5	0	0	0	5	1	2	0	31	15	36	0	2	3	8	0	2	3	12	1	45	22	58
March	0	0	2	28	0	0	0	4	0	13	9	44	1	17	2	12	0	5	2	4	1	35	15	92
April	0	1	3	5	0	0	0	1	0	17	11	13	0	0	0	0	0	3	3	4	0	2	17	23
May	0	1	0	0	0	0	6	0	3	21	16	68	0	0	4	2	1	20	2	8	4	42	28	78
June	0	13	2	9	0	12	4	11	5	24	4	33	0	3	3	4	0	8	8	10	5	60	21	67
July	0	0	3	9	0	0	3	9	1	7	15	60	0	9	3	1	0	16	6	16	1	32	30	95
August	2	14	3	4	1	15	1	3	5	71	16	71	0	20	1	2	5	32	5	13	13	152	26	93
September	0	0	0	0	0	1	3	6	2	18	14	49	1	12	12	9	3	12	4	14	6	43	33	78
October	1	1	2	5	0	1	4	0	0	13	23	65	0	0	2	6	0	0	2	11	1	15	33	87
November	0	0	2	2	0	0	6	10	0	21	15	83	0	12	5	10	2	13	8	16	2	46	36	121
December	0	5	0	4	0	1	1	10	1	32	16	85	4	0	4	4	1	15	4	24	6	53	25	127
Year	4	44	19	68	1	36	33	68	19	287	175	680	6	92	42	62	16	157	56	146	46	6 6	325	1,024
Year, 1897	2	92	27	45	7	95	27	58	28	293	137	451	4	52	47	69	21	100	38	104	62	632	276	727
Year, 1896	11	144	22	42	0	32	48	41	89	310	154	349	23	97	59	84	5	35	35	85	128	618	318	601
Year, 1895	2	106	16	69	4	52	30	73	17	378	157	415	6	43	46	100	9	122	53	82	38	701	302	739
Year, 1894	3	33	23	70	5	19	24	56	127	202	136	462	16	95	61	145	7	61	36	112	58	410	280	845
Year, 1893	15	336	32	121	3	64	47	75	52	634	243	742	1	56	156	167	7	150	46	138	78	1,240	424	1,243
Year, 1892	23	322	39	103	2	85	61	93	178	514	271	718	5	88	72	177	8	117	47	113	116	1,126	490	1,204
Year, 1891	24	291	45	101	7	90	42	65	114	458	345	939	23	116	57	154	9	228	61	188	177	1,183	550	1,447
Year, 1890	19	195	61	126	4	86	30	77	15	624	337	959	21	103	60	165	10	216	81	192	172	1,224	569	1,519
Year 1889	16	167	30	81	7	58	24	63	46	291	189	595	34	107	53	120	5	122	40	119	108	745	336	978
Year, 1888	5	195	45	153	16	65	35	92	92	388	217	573	11	106	77	163	44	258	60	117	168	1,012	434	1,098

A comparison covering the last five years is shown in the following table. The third line of this table gives the total casualties, omitting the "other" persons (mostly tramps).

	1898.	1897.	1896.	1895.	1894.
Accidents	2,228	1,658	1,357	1,487	1,560
Total killed	426	417	540	415	442
Pass. and emp. killed	371	338	446	340	338

In April, which nearly always has a low accident record, the average number of persons killed reached the lowest point in our record, only 0.6 per day; per accident the average was 0.14.

The information given in the large table published herewith covers the same ground as in previous years, and the table is self-explanatory. We may repeat that the record is in no sense official, being gathered mostly from newspaper accounts which we find in local papers published in all parts of the country. Inquiry is made, however, of the officers of the roads concerned, for the purpose of confirming the reports of the more serious accidents, especially those in which passengers are killed or injured, and those of which the cause is unusual or obscure. The classification of the accidents in the table is somewhat arbitrary, accidents which are due to two or more causes being shown under the head only of the more prominent cause.

Though the introduction of the block system, the extension of the use of air brakes, improvements in discipline and in construction of track, cars and engines have reduced the risk to life and limb, the lessons to be derived from the train accident record are no less instructive than those of former years. One of the important lessons, and one which is frequently repeated, is that of the value of stout platforms and vestibules in fast passenger trains. These features we have not been able to dwell upon in detail, except in one or two cases, but there can be no doubt that many lives have been saved by them. Various lessons on the advantage of the space interval over the time interval method of running trains have been set forth in our monthly articles (January, April, July, November and December).

The total number of casualties to persons recorded during the past seven years is shown by years in the following table:

	1898.	1897.	1896.	1895.	1894.	1893.	1892.
Passengers killed	46	62	128	38	58	178	116
Emp. killed	325	276	318	302	280	424	490
Others killed	55	79	94	75	104	89	66
Total killed	426	417	540	415	442	691	672
Passengers injured	616	632	618	701	410	1,240	1,128
Emp. injured	1,024	727	601	739	845	1,243	1,205
Others injured	61	113	78	95	88	101	74
Total injured	1,701	1,472	1,297	1,535	1,343	2,584	2,407
Train mileage, millions*	858.0	850.7	834.2	818.4	889.4	864.9	
No. persons killed per million train-miles	0.485	0.646	0.497	0.540	0.777	0.777	

*Train mileage is taken from Poor's Manual, which gives revenue mileage only.

The relative frequency of the more prominent causes of collisions for six years past is shown in the following table:

	1898.	1897.	1896.	1895.	1894.	1893.
Train breaking in two	143	155	93	96	88	118
Misplaced switch	63	48	51	42	50	80
Failure to give or observe signals	115	58	33	64	54	108
Mistake in giving or understanding orders	47	33	48	35	31	67
Miscellaneous	246	149	99	117	166	240
Total explained	614	443	324	354	389	613
Unexplained	398	288	190	248	224	393
Total	1,012	731	514	602	613	996

An item which appears with increasing frequency among the causes of freight train accidents is "too quick application of air brakes." This figured in 12 or more accidents which were recorded in 1898, and also without doubt in scores of accidents which were of too little consequence to get widely published in the newspapers, but which were in the aggregate costly, and which no doubt injured many trainmen. It is not always possible, in reports of accidents of this kind, to discover whether there was negligence on the part of the engineman, or defect in the hose or other appliance, or a combination of both causes. But accidents of this class emphasize the importance of systematic and thorough instruction in the use and care of air brakes, and call our attention anew to the very valuable work of the Westinghouse air brake instruction car, concerning which we recently had something to say. Another item which is increasing, is derailments at derailing switches. This cause has appeared, during the past year, thirteen times, an average of more than one a month.

The record of accidents on street railroads, made up on the same basis as that employed in the train accident record, appears as follows:

STREET RAILROAD ACCIDENTS.

	1898.	1897.	1896.	1895.	1894.
Number of accidents	133	108	182	117	61
Number of persons killed	27	31	37	45	8
Number of persons injured	378	355	545	298	100

A few of these accidents were on cable railroads, but nearly all occurred on electric lines. The worst one of the year was that at Cohoes, N. Y., in September, where 15 passengers were killed on a steam railroad crossing.

Annual Reports.

Pennsylvania Railroad Co.—The results of operation of the Pennsylvania Railroad Co. for the year 1898 were made public on Tuesday of this week. The gross earnings of all the properties east of Pittsburgh and Erie amounted to $65,603,738. Deducting working expenses the net earnings were $21,093,722; adding interest from investments and rental of equipment and other items, the gross income was $26,560,366. Last year the gross income was only about $100,000 short of this, but it had increased over the year before by the handsome amount of $2,404,000, or about 10 per cent. The gross earnings in 1898 were about $1,400,000 more than in 1897, in which year they were about $2,127,000 greater than the year preceding. Having deducted rentals and interest to the amount of 16½ millions, there remained net income of $10,228,728, out of which a 5 per cent. dividend was paid; the sum

of $1,800,000 was transferred to extraordinary expenditure to complete work already authorized in revising grades, etc., and $843,000 was transferred to the credit of profit and loss.

The freight movement on the three grand divisions east of Pittsburgh and Erie was 84,802,000 tons, the increase over last year having been 6.59 per cent. The passenger movement increased 2.76 per cent. and aggregated 35,963,000.

The lines west of Pittsburgh and Erie showed a reasonable profit; that is, after meeting all charges and liabilities of every kind there was a net profit on these lines of $1,880,744. Last year the net profit on all the lines west of Pittsburgh was $2,337,000 and the year before it had been $675,000.

There was a still further reduction in freight rates in the last year, the average rate received per ton per mile having been but 4.99 mills, but the cost of movement was reduced to 3.55 mills per ton per mile. This wonderful result is, of course, the outcome of years, but the change in the last year was very important. In 1897 the average rate received per ton per mile was 5.36 mills and the year before 5.64. The cost in those two years was respectively 3.69 and 4.09. The President speaks especially of the influence of heavier motive power, cars of greater capacity and the improvements in track and facilities as having helped to bring down the cost of freight transportation. It will be noted that this work is still to go forward, as the sum of $1,800,000 was set apart from last year's net earnings for extraordinary expenditures. Charges to capital account last year included $784,000 for additional tracks, which represents improvements that have largely added to the capacity of the line for prompt and economical movement. In the year four tracks west of Altoona, as far as Kittanning Point, were completed, and there is now a complete four-track system from Altoona, at the foot of the eastern slope of the mountains, to Lilly on the western slope, a distance of about 17 miles, with the exception of four miles between Kittanning Point and Allegrippus, where three tracks are in operation. As our readers know, the Portage tunnel has been rebuilt and the Portage road doubled tracked for about five miles. A special appropriation for extraordinary expenditures ($1,800,000) was made out of the earnings of 1897 (the same sum having been set apart from 1898) and a large part of the work of revising grades and alignment, which was begun in 1895 and suspended by reason of the business depression, was completed. We have, from time to time, given details of a good deal of this work in our railroad construction columns and in special articles. A large expenditure was also made in air brakes for freight cars, and in automatic couplers and in otherwise improving the motive power and the rolling and floating equipment.

It is proposed to apply the appropriation out of 1898 earnings largely on the United Railroads of New Jersey Division. This will complete the passenger station in Jersey City and the new bulkhead wall at Desbrosses street ferry and build a new ferry house there. It will also complete the electro-pneumatic automatic block signals from Monmouth Junction to Rahway, and the system will then be continuous on the New York Division. The sum of $150,000 was spent last year between New York and Pittsburgh on such signals.

Other heavy expenditures for improvements have to be faced, which include revision of alignment on various parts of the main line and increased terminal and yard facilities at various places. Special mention is made of the fact that a suitable passenger station must be provided in the city of Pittsburgh. The present structure was built in 1877, and the traffic there has far outgrown the facilities. About 1½ million dollars will be required for that purpose. Furthermore, considerable track elevation must be done in Pittsburgh, and negotiations are now progressing with the municipal authorities of that city looking toward these improvements.

The President's report closes with especial mention of the retirement of Mr. F. Wolcott Jackson, after 31 years of faithful and honorable service as General Superintendent of the United Railroads of New Jersey. Mr. Jackson has been appointed Resident Manager of that division, and is especially charged with questions affecting terminal facilities in New York Harbor.

The British Board of Trade has brought in a bill designed to secure greater safety for the employees of railroads. Mr. Ritchie hopes at least to get the bill passed to its second reading and referred to a select committee, and then the railroad companies will have an opportunity to present their side of the question to this committee. In fact, Mr. Ritchie is reported to have expressed some hope that the bill could be passed at this session. As we gather from the accounts of this bill in the latest issue of Transport, which has reached us, the powers to be conferred upon the Board of Trade will permit them to require the railroads to use automatic couplers after the lapse of a period of five years, and they may be required to use power brakes on freight engines after two years, but the question of continuous brakes for freight trains is not taken up in the bill. In fact, the bill is strictly permissive, so far as the Board of Trade is concerned. It does not require, but permits, the Board to compel the railroad companies to adopt either of these devices for greater security, and the Board cannot compel the adoption of the automatic coupler within less than five years. Mr. Ritchie predicted that if it were known that the railroads would be required to put on automatic couplers within some definite time, there would be a dozen suitable inventions offered within six months. We could furnish a few from this country within six weeks, and we would recommend the makers of car couplers in the United States to keep watch of this movement in Great Britain.

The Pittsburgh & Western, which was one of the first roads to adopt large capacity steel coal cars, has found that its trains of steel cars have an average of about 300 tons more of paying load than similar trains of wooden cars. Mr. H. O. Dunkle, the Superintendent, says that formerly 640 tons of coal were hauled on that road in a train of 18 wooden cars, or 35.5 tons per car, while now the same number of steel cars are hauled loaded with 940 tons of coal, or 52.2 tons per car, and it is thought even a better record is possible. Mr. Thomas Anderson, the Master Car Builder, further states that his records show that the cost for maintaining the steel cars is about 60 per cent. less than that for wooden cars, but the steel cars are yet new and the maintenance charge is perhaps too low.

NEW PUBLICATIONS.

The Locomotive Up to Date. By Charles McShane. Octavo, cloth, 711 pages, 380 illustrations. Chicago: Griffin & Winters. 1899. Price, $2.50.

In the prospectus of the publishers this book is referred to as "the greatest accumulation of new and practical matter ever published" on the subject of the locomotive. This is not a bad way of putting it, had they left out the words, "greatest," "practical" and "new." The book is certainly not a compilation or a treatise, but an accumulation of matter, good and bad, thrown together with a pitchfork; and in the process the interests of the inventors and makers of locomotive appliances have not been allowed to suffer. Aside from the mere accumulation, it is as bad a piece of book making as we have seen for a long time. Mechanical blemishes may be overlooked when the subject matter of a book has been selected with good judgment and adds to the present literature, or even puts old information into a more convenient form for reference. This book, however, seems to have none of these redeeming features.

There is first a two-page history of the locomotive, followed by 78 pages on slide valves, giving much of the usual matter to be found in text books, and a number of descriptions of patented valves, prepared by the inventors. Valve gears are treated in much the same way, the chapter including extracts from Mr. Halsey's recent book on the errors of the link motion; 51 rules are given for setting valves.

The chapter on steam engine indicators is mainly a contribution from the Crosby Co., while the subjects, injectors, boiler checks, steam gages, etc., have furnished opportunities for illustrating the various devices now on the market. Seventy-five pages are given to compound locomotives, made up largely of illustrated articles said to have been especially prepared by the builders, and while many of these are written in catalogue style, when taken as a whole they probably form the best portion of the book. There are also chapters on accidents to locomotives, combustion, incrustation, fast runs, and some pictures and leading dimensions of locomotives. Machine and shop work is given much space. Mr. C. B. Conger's little book, "The Air Brake Catechism," is reprinted, as well as the "Air Brake and Signal Instructions" of the Master Car Builders' and Master Mechanics' Associations. Finally we are told how to calculate the leverage of the brake gear of cars and locomotives, and the Westinghouse high speed air brake is described and illustrated.

The Roadmasters' Association of America.—The Proceedings of the sixteenth annual convention of the Roadmasters' Association of America, held at Denver last Septmber, are now published in pamphlet form and may be had of the Secretary, J. B. Dickson, Esq., Chicago & Northwestern Ry., Stirling, Ill. This number of the Proceedings contains some papers and discussions of more than usual value. The discussion on the Creeping of Rails we have found very interesting and instructive. The report on Tie Plates has a certain historical value, and together with the discussion gives information as to performance of tie plates in service. The reports (majority and minority) and the discussion on Long Rails and Miter Joints are also important.

For the seventeenth annual convention there is to be another report on Long Rails, Miter Joints, etc., by a committee of which Mr. V. T. Douglas, Chesapeake & Ohio, is Chairman; a report on Track Joints, P. Rockwell, M., K. & T., Chairman; Right of Way Fences, J. A. Prentice, Lake Shore & Michigan Southern, Chairman; Tamping Ties in Various Kinds of Ballast, John Doyle, Chicago & West Michigan, Chairman; Embellishment of Station Grounds, M. Sullivan, Michigan Central, Chairman; a paper on Standard versus Compromise Cars is promised by Mr. C. C. Dunn, Atlantic Coast Line, and another paper is promised by Mr. Coates, of the New York, New Haven & Hartford, subject not announced.

The Journal of the Iron and Steel Institute. No. 2, 1898. Bennett H. Brough, Secretary. London: E. & F. N. Spon; New York: Spon & Chamberlain, 1899.

The fifty-fourth volume of the Journal of the Iron and Steel Institute (British) contains the minutes of the proceedings of the Stockholm meeting held last August and September. The papers, discussions, etc., of that meeting fill 262 pages and some of the papers are of unusual interest.

TRADE CATALOGUES.

The Bucyrus Company, South Milwaukee, Wis., has issued a 150-page, cloth-bound catalogue, 7½ x 10¾ in., illustrating and describing the dredging and excavating machinery made by that company, including steam shovels, small and large dipper dredges, elevator and hydraulic dredges, centrifugal pumps, wrecking cranes and placer mining machinery. The engravings are made from photographs and drawings and the text has evidently been prepared with much care. The descriptions, while brief, contain the information that buyers of such machines will find useful.

The Dayton Malleable Iron Co., Dayton, Ohio, has issued eight 6 x 9 in. circulars, illustrating a number of the malleable iron specialties made by this company. These include the following: The Dayton freight car door fastener; the Dayton brake wheel and Kelly brake fork; the Gunn roof saddle for running boards; track wrenches, track gages, rail braces and similar supplies used by the track department; a great variety of wrenches for shop use, shop and engine torches, fire shovels and coal picks.

Machinery, Tools and Castings.—The Brown & Sharpe Mfg. Co., Providence, R. I., send us their 1899 catalogue and price lists, covering machinery, tools and castings, cutters, test tools, U. S. standard rules, standard gages, etc. Our readers are familiar with this little blue volume, packed full of important knowledge. Special colored pages call attention to the machines and tools added during 1898. These are so numerous that we shall not attempt to mention them here.

The Bethlehem Foundry & Machine Co. of South Bethlehem, Pa., manufacturer and designer of metal wood-working machinery, has issued a 32-page catalogue descriptive of the different variety of machines turned out by the firm. These include Bethlehem rotary shears, bending machines, pneumatic alligator riveters, vertical gap riveters, crimping mills, power presses, punching, shearing and forging presses and pressure blowers.

The Toledo Foundry and Machine Co., Toledo, Ohio, in its catalogue for 1899, 6¾ x 9¾ in., describes and illustrates the Victor steam shovels, wrecking cars, dredges and ditchers, centrifugal sand pumps, pile drivers and locomotive turntables. This pamphlet contains 94 pages and numerous engravings made from photographs showing the various machines working.

Cast Iron.

(*Continued from page* 171.)

iron is being studied more than ever, its strength is being raised by changes and improvements in processes, and there is on the market to-day a range of irons from sash weights up to gun metals.

According to our general understanding, cast iron is that form of iron which contains more than 1½ per cent. carbon, and from its nature can only be cast into molds to be of commercial value. A closer examination shows us some limitations to this definition. A thin bar of ordinary cast iron can, under suitable conditions, be heated in the forge and then twisted, thus showing a property at variance with our intuitive feeling of what cast iron should do. Again, many street railroad gears are sold as steel because the teeth can stand considerable punishment before breaking, and yet the iron is only an excellent grade of gun metal which has received the additional benefit of some annealing.

Cast iron in its true sense is, therefore, best classed as that grade of iron carrying over 1½ per cent. carbon, which, after casting, is not subjected to further heat treatment. Thus pig iron is a true cast iron, for the metal, as it comes from the blast furnace, if of the proper composition, could be used for the direct casting of certain kinds of work, such as ingot molds. Malleable cast iron, however, is not a true cast iron, for though the casting process is used, the original refining and subsequent annealing, with its radical metallurgical changes, place this most interesting material in a separate class entirely distinct from both cast iron and cast steel.

The range of pig irons with which we deal are

either high, medium or low, in their constituents other than the iron. For current use, it is still convenient to speak of "Bessemer" iron, which for the foundry means phosphorus below 0.1 per cent., low sulphur and medium to high silicon; "softeners," which mean silicon between 4 and 8 per cent.; and "ferrosilicon," which means 8 per cent. silicon and above.

The foundry pig irons proper give us the choice between the following compositions: Phosphorous, from 0.7 to 2.00 per cent.; silicon, .14 to 3.25 per cent.; sulphur, .02 to .15 per cent.; manganese, .30 to 2.00 per cent., and total carbon from 2.50 to 4.50 per cent., the proportion of graphite and combined carbon going to make it up, depending entirely upon the heat conditions and the amount of silicon, sulphur, manganese and phophorous,—important in the order named—which may be present. One can readily see that, with the limits above given, there may be an endless series of combinations, and when it is remembered that to be able to predict successful results, as required nowadays, as well as to attain them, close attention must be given to this matter, and the lot of that founder who does not believe in chemistry, or rather, metallurgy, in his works, will eventually become a hard one.

We come now to the process for making cast iron. For the production of castings on a commercial scale, there are practically only two: melting in the cupola or shaft furnace, and melting in some form of the reverberatory furnace. The use of crucibles for melting may still be found in experimental work, and possibly in some remote corners of the earth where civilization has not yet given the inhabitants the means of scraping together more dollars, in a given time, by legitimate means. Yet this crucible process is the one calculated to give the cleanest iron. We see this by analogy with crucible steel. The open hearth process can make a material exactly like that from the crucible in composition, yet the latter is so much better on account of its freedom from slag and oxidation. The chemical processes have more time, and the last traces of slag rise to the top.

One of the principal sources of danger is the sulphur in the coke. Too much care cannot be given to keep this as low as possible, and many a casting which failed unaccountably may be found full of microscopic cracks due to the absorption of this sulphur by the iron passing over it, resulting in an effect well expressed by the current term "redshortness," were it steel instead of cast iron. The bulk of our castings are made by the cheap and convenient cupola method. It is still crude, in spite of many attempts to use the surplus heat now lost.

It is practically impossible to speak of the physical without taking into consideration the chemical properties of cast iron, and *vice versa*. A casting freshly broken may be either gray, white, in a condition running between the two, called "mottled," or it may be gray in the centre, then mottled, and finally white at the edges. Again, the fracture may show a distinct line separating a gray centre from the white chilled rim, as in car wheels and chilled rolls. All of these conditions, whether produced naturally or otherwise, are dependent upon the composition and the thermal changes.

Then we have the crystalline structure, similarly affected. Thus the crystals at the edge of a casting are usually small, and in the harder irons may be seen arranged in layers perpendicular to the surface, causing planes of weakness at abrupt changes in direction on the part of the piece. The interior of the casting, if thick, has larger crystals, and is consequently weaker than the skin. This holds true only if the casting-strains in the piece are not excessive, otherwise we may have the casting in a state of tension such that a comparatively small additional load causes it to give way, the true explanation for many a mysterious failure.

To get rid of such casting-strains in the production of work to be finished up true, very heavy cuts must frequently be taken off. We are all familiar with the strains in pulley arms and rims, and it was the writer's good fortune, in a Western mining region, to see an immense sheave for rope haulage, which had just been taken out of the foundry to clean up, break, at the junction of those spokes with the rim, where the heat of the sun, shining on part of the wheel, had added the very slight tension necessary to cause the wreck. Where irons are cast into chills, these casting-strains are increased enormously.

One can readily perceive what a delicate matter it sometimes becomes in casting very heavy work with great variations in the thickness of the sections, to so combine the irons that a composition is obtained which, when hot enough to properly run into the thin webs and ribs, will not become white, or at least not hard enough to cause undue contraction and make machining impossible. The fact that the physical condition of a casting is a resultant of these three variables is often lost sight of by those who write papers and are familiar with the laboratory end of the foundry only. Too much stress cannot be laid upon the absolute necessity of being fully equipped with a practical knowledge of the essentials of founding iron before venturing to advise others upon its metallurgical end.

Cast iron is subject to two further troubles, which have a distinct bearing upon its general behavior. They are segregation and shrinkage. A fruther difficulty to which many a failure to obtain sound castings may be laid, is the presence of gas in the iron. This manifests itself by coming out at the moment the metal sets. If it can get away through the mold, well and good; if not, a smooth-walled aggravating hole, just under the skin, and often defying detection, is the result. The trouble may be laid to the handling of the furnace or cupola, the use of burnt material, and probably what is least suspected, the tendency of late years to produce pig irons too fast, with the resulting liability of oxidizing them slightly.

The purpose for which a casting is to be used, naturally has, or should have, a deciding influence upon the kind of irons selected for making it. The days when anything went have passed, and the result has been a very discriminating specialization of the work. In a jobbing foundry, this may be taken care of, to some extent, by suitably mixing the charges in the cupola, but in general we find the best results obtained in shops arranged with their special ends kept constantly in view.

Tests.

The tensile test is one very difficult to apply properly, but gives sufficiently high values to allow a differentiation, having a given size and shape of bar cast under as nearly the same conditions as possible. The tensile strength of cast iron may run from 14,000 up to 35,000 pounds per square inch, the former being found in soft, but bulky castings, and the latter in the highest grade of gun metal, strengthened with the addition of steel scrap. Here we see the effect of lowering the carbon in the casting, the strength, as a consequence, going up. High silicon lowers the strength; phosphorus, when not over 0.5 per cent., which is the safe foundry limit, rather stiffens the iron, makes it pull stronger, but leaves it brittle, Ordinarily, castings should run between 17,000 and 20,000 pounds per square inch tensile strength.

The modulus of elasticity of cast iron varies from 10,000,000 to 30,000,000, showing the utter lack of value of tests made on cast iron, unless all the conditions existing at the time are taken into consideration, and preferably all the outside influences affecting the results removed as much as possible. Again, a set of bars of the same cross section, but of regularly increasing length, when tested showed a regularly decreasing tensile strength, the last being actually one-half as strong as the first. Results of this kind shake one's faith in all tests on cast iron, but this very circumstance makes it all the more important to dive deeper into these mysteries and get more light and those rewards, always coming (usually to the other man, however), from patient investigation and study.

The transverse test of cast iron is the easiest to carry out, and with the same cross section, same distance between supports and the identical method of testing, the records are in some measure comparable. Yet it is idle to wade through elaborate tables giving the modulus of rupture of cast iron calculated to the square inch, when we know that the same iron, in bars of the same section, when tested with varying distances, between supports, gives hopelessly discordant values when the regulation formulae are applied. No wonder that the modulus of rupture per square inch, for cast iron thus calculated, varies from 10,000 to 65,000 pounds. In making transverse tests, the load applied to produce rupture, as well as the deflection, should be noted. Here, also, we have the effect of a moderate amount of phosphorous, showing itself in an increased strength and amount of deflection, but it will be noted that this is the case only with a very gradually-applied and slowly-increasing load, for the slightest shock means an instant break.

The crushing strength of cast iron is, so to say, its strongest point. It varies from 40,000 to 200,000 pounds per square inch. This test is seldom made, for if the iron is sufficiently strong to come up to all the other requirements, that of resistance to crushing is almost superfluous. Nevertheless, for certain classes of work, such as rolls and hammer dies, much could be learned in this way, especially when combined with heat conditions.

Impact tests on cast iron are almost unknown, but could be made with considerable profit, even though objections have been made on the ground that cast iron is never exposed to shock while in service. Once efficient machinery for this method of testing is provided, we shall hear more of it. We now have some vague ideas of the resistance of cast iron to shock from resilence calculations made of bending tests, but these results are empirical and need further extension and study.

A test for the hardness of cast iron would be a desirable addition to our list, and several ingenious methods have been brought out for this purpose. They will fail to be adopted generally, for we again strike the lack of homogeneity in cast iron which will leave the skin harder than the interior, and the cooler portion of the iron, while casting, softer than the hotter immediately at the gate. The methods of testing hardness, commercially, will, therefore, remain of local application, each shop requiring such a test getting up its own modification. Careful regulation of the mixtures and casting temperatures should go a great way to make this style of test only desirable in special cases.

There are other tests, such as punching and shearing, for fluidity, contraction, chill, behavior under heat, etc. This much can be said, that the testing of cast iron is in so crude a state as yet that formulating elaborate specifications to cover anything but the most general points is often a positive injustice to the founder, and moreover, a retardation of progress toward an international agreement on standard methods of testing.

TECHNICAL.

Manufacturing and Business.

Daniel W. Mead, Consulting Engineer, has opened an office at 605 First National Bank Building, Chicago. He will make a specialty of hydraulic works, water works, sewage works, power plants and power transmission installations.

The Falls Hollow Staybolt Co. is in receipt of a large order from the W. & A. Fletcher Co., of Hoboken, N. J., for safety hollow staybolt bars, made of steel, to be used on a large government contract. The Falls Company will fill orders promptly for its product, made of either steel or charcoal iron.

The Standard Coupler Company has removed its New York office from the Havemeyer Building, 26 Cortlandt street, to room 18, fourth floor, 160 Broadway.

J. E. Parmelee, Inspecting Engineer of the Q & C Co., with headquarters at New York, died at Kittanning, Pa., March 2.

During February the Edward P. Allis Co., of Milwaukee, received a number of large orders. Among them were 5 vertical cross-compound blowing engines, for Laughlin & Co., of Pittsburgh, each weighing about 350 tons; two more cross-compound engines for the power station of the South Side Elevated, Chicago, to drive 1,500 kw. generators; four large compound engines of about 1,500 horse-power each for the McCormick Harvesting Co., and another engine for the Buenos Ayres, South America, tramways.

Hobson & Co. have moved from 4 Stone St. to 17 State St., New York.

The New York office of the A. French Spring Co. has been moved from the Boreel Building to the Empire Building, 71 Broadway.

The Charles Scott Spring Co., of Philadelphia, has engaged the services of J. T. Harahan, Jr., to represent it, in connection with William V. Kelly, at Chicago, Ill., with offices in the Fisher Building.

Mr. L. C. Weir has been elected President and General Manager of the Weir Frog Co., in place of F. C. Weir, deceased.

The Wilfred Eames Mfg. Co. of Rochester, N. Y., has been incorporated by Wilfred Eames, Mardon Goodale and A. H. McCall, with a capital of $10,000, to make grinders.

Iron and Steel.

At the annual meeting of the stockholders of the Franklin Steel Casting Co., Franklin, Pa., Charles W. Mackey was elected President; Charles Miller, First Vice-President; James W. Rowland, Second Vice-President; W. J. Bleakley, Treasurer; Robert McCalmont, Secretary, and W. B. Corinth, General Manager. A quarterly dividend of 1½ per cent. was declared.

New Stations and Shops.

The round-house in Louisville, Ky., occupied jointly by the Illinois Central and the Louisville, Henderson & St. Louis, was destroyed by fire Feb. 28. Press dispatches state that two freight engines and one passenger engine belonging to the Illinois Central were destroyed.

Permits have been issued to the Texas Pacific for building at Fort Worth, Tex., a passenger station, round-house and shops.

Ground has been broken for the new station of the Pennsylvania Company at Rochester, Pa. The contract was secured by Trimble & Sons, of Allegheny.

The round-house of the Southern Pacific at El Paso, Tex., was destroyed by fire Feb. 28; three locomotives were damaged.

The Masonry Dry Dock.

In conference compromise was reached on the Senate amendment to construct of masonry, instead of timber, the four dry docks authorized by the last Naval Appropriation bill. The compromise permits one of the docks to be built of masonry, the others of timber, as originally provided.

Steel Underframes.

The Pennsylvania Lines West of Pittsburgh are preparing to make service trials of flat bottom freight cars having metal underframes and wooden bodies. Three cars have been built at the Columbus shops in accordance with the plan submitted by Mr. R. P. C. Sanderson to the M. C. B. Association in 1897, the only changes made being in the minor details. It will be remembered that the essential features of this design were the use of commercial shapes

throughout, heavy center sills formed of steel channels, cross girders built up of plates and angles for transmitting the side loads to the center sills, while no truss rods were used.

The Hudson River Tunnel.

On March 2 the Court of Chancery in New Jersey ordered the sale of the property of the Hudson River Tunnel Railroad Co. under an execution for $3,916,-894.60, secured by the Farmers' Loan & Trust Co., as trustee in foreclosure proceedings for money loaned on mortgage and unpaid interest from 1892. It is understood that this is simply a preliminary proceeding for reorganizing the company and proceeding with the work. Mr. C. M. Jacobs, who has been in England for some time, partly in the interests of the tunnel company, has returned to this country and is quite confident that the work will be taken up in a short time. His plan is to push one tunnel to the New York side, it having been completed for about two-thirds of the distance from Jersey City. In this tunnel it is proposed to put two narrow gage tracks and run special cars, carrying city passengers and the traffic from the railroads which have a terminus in Hoboken and Jersey City, to New York.

The Long Island Railroad Tunnel.

On Saturday evening of last week Mr. C. M. Jacobs, C. E., and Mr. W. H. Baldwin, President of the Long Island RR., spoke at the Union League Club, Brooklyn, on the subject of tunnel railroads. Mr. Jacobs referred in his address particularly to the London tunnels, illustrating his remarks by views thrown on the screen. He spoke of the possibilities of building a tunnel through almost any soil or rock and from his remarks it was evident that cities in this country were considerably behind London in the matter of tunnel railroads. Mr. Baldwin spoke particularly of the proposed Long Island Railroad plans in connection with the Atlantic Avenue Commission of Brooklyn, the plan for improvements on Atlantic avenue and for building a tunnel from Brooklyn under the East River to New York. Mr. Baldwin stated that the plans had been practically completed; all that was now needed was the necessary rights. Three bills are before the New York Legislature similar to measures that passed both houses at Albany three years ago, but failing to receive the signature of the Governor, did not become a law. The first and second measures of the bills which are now being discussed at Albany accomplish the same result, as far as the Long Island Railroad is concerned, and provides in brief that the 25-year time limit which the New York City charter imposes on city authorities in granting railroad franchises, shall not apply to tunnel railroads. An outline of the tunnel plan with the Atlantic avenue improvement, was given in our issue of Jan. 27, 1899, in connection with the lecture by Mr. J. Vipond Davies before the Brooklyn Institute of Arts and Sciences. In brief, it provides that the tunnel part of the scheme be carried out as a private enterprise, while the expense of the Atlantic avenue improvements will be shared equally by the city and the railroad. Over the depressed tracks on Atlantic avenue and on the level of the street up to Bedford avenue, an electric road is proposed. Between Bedford and Nostrand avenues the tracks will be raised to an elevated structure and carried out for some distance, when the trains will return again to the surface. Mr. Baldwin stated that the railroad came before the public with this plan in good faith and urged that an effort be made to have the bills now before the Legislature passed as soon as possible in order that the work may not be delayed.

THE SCRAP HEAP.

Notes.

At Charlotte, N. C., on March 2, the freight house of the Southern Railway was destroyed by fire, together with a cotton compress, 4,000 bales of cotton and other property, all aggregating $400,000.

The Allen law, regulating street railroads in Illinois, has been repealed. This abolishes the power of cities to grant franchises for longer than 20 years. It is said that Governor Tanner was opposed to the repeal of the law, but that he finally approved it in consequence of strong appeals from hundreds of individuals.

A bill creating a State Railroad Commission has been passed by the Legislature of Indiana. One of the two commissioners must be a railroad man of 10 years' experience in the operating department, and one must have had 10 years' experience in managing railroads. Both must be over 35 years old. The commissioners are to receive salaries of $2,000 each.

A bill to establish a railroad commission has been passed by both Houses of the Arkansas Legislature. The bill regulates railroad and express companies. Three commissioners are to be named by the Governor, and they are to receive a salary of $2,500 each, to be paid by the state. One is to be selected from the First and Sixth congressional districts, one from the Second and Third, and one from the Fourth and Fifth districts, subject to the confirmation of the Legislature in joint session. After the first term the commissioners are to be elected at the state general election.

The length of submarine telegraph cables in the world at the present time is 170,000 miles, according to a report lately issued by the Bureau of Statistics of the United States Treasury Department. The cost of these cables is estimated at $250,000,000, and the number of messages sent over them annually is 6,000,000. The same report estimates the total length of land telegraph lines in the world at 835,000 miles, with 3,500,000 miles of wire or conductors; total number of messages annually, 365,000,000. The governments of the world keep about 80,000 miles of cable on hand for use in case of war.

Street Car Fenders in Chicago.

The Chicago City Ry. was last week summoned to appear in court and show why it should not pay fines of $100 in each of ten cases brought against it by the city for failing to provide its cars with fenders as required by city ordinance. The North and West Side cable and electric cars are equipped with fenders, and it is claimed that figures compiled from the police department records show that during the last two months the fatalities on Chicago street railroads have decreased 85 per cent., and that only three persons were killed on street railroads during that time, against eight for the same period last year, and an average during the last half of 1898 of nine deaths each month. Those who favor fenders for street cars say that the decrease is due to their use on the two large systems named.

Ohio Train-Stopping Law Sustained.

The Supreme Court of the United States has handed down a decision, written by Justice Harlan, construing the constitutionality of the law of Ohio regulating the stoppage of through trains at stations in the State. The law requires that any railroad company shall have at least three trains a day, if so many are run, stop at any station on its line containing not less than 3,000 population. The action was begun against the Lake Shore because of its refusal to have three of its trains stop at West Cleveland. The railroad contended that the statute interfered with commerce between the States. The court held this contention to be unfounded, saying that the question involved was only that of serving the public convenience, and that the State had a right to legislate to that end. The judgment of the Supreme Court of Ohio was therefore affirmed. Justices Brewer, Shiras, White and Peckham dissented, and Justices Shiras and White delivered dissenting opinions. Justice White based his dissent on the ground of discrimination against through trains. Justice Shiras contended that trains running from one State to another, carrying mails, etc., were subject to the control of Congress, and not to the control of State legislatures. The question was, he said, one of the convenience of the entire public, and not that of the local public alone.

The Electric Railroads for Shanghai.

Blackall & Baldwin, 39 Cortlandt street, New York, have postponed the time for receiving bids for building the 23 miles of electric tramways in Shanghai from March 15 until June 30. (Dec. 9, 1898, p. 881.) The plans may be obtained upon application to the above upon a deposit of $500. J. O. P. Bland is secretary, Council Room, Shanghai.

Increases in Wages.

Press dispatches from various points announce advances in wages. From Pittsburgh, 50c. a ton in steel billets and Bessemer pig iron, to be followed by an increase of 8 per cent. in the wages of skilled workmen, the advance affecting 15,000 men. From Sharon and Sharpsville, Pa., at all blast furnaces of from 10c. to 15c. a day, affecting 1,500. From Waukegan, Ill., at the Washburn & Moen Co., of 5 per cent. on job work and from 5 to 10 per cent. on day wages. From Anderson, Ind., an advance at the American Steel & Wire Co. of from 5 to 10 per cent., affecting 1,000. From Baltimore, Md., 10 per cent. in the wages of all employees of the Maryland Steel Co. at Sparrows Point. From Catasaqua, Pa., at the Crane Iron Co. 10 per cent., affecting 300, and at the Thomas Iron Co. 10 per cent. From Reading, Pa., at the Reading Iron Co., affecting 2,000. From Bellaire, O., at the Riverside Iron Works, 10 per cent., affecting 3,000. From Hollidaysburg, Pa., at the Portage Iron Works in Duncansville, 25c. a ton for puddlers, and 10 per cent. for all others, affecting 500. From Chicago at the mills of the Federal Steel Co. in Illinois and Wisconsin, 8 per cent., affecting 15,000. From Lebanon, Pa., at the Pennsylvania Bolt & Nut Works, 10 per cent. in puddling and rolling mill departments; at the Lebanon Rolling Mills a similar increase; at the Swedes Furnace in Norristown, 10 per cent. From Pottstown, Pa., at the Glasgow Iron Co., in puddling department. From Dunbar, Pa., at the Dunbar Furnace Co., about 5 per cent. From Birdsboro, Pa., at Brooke Iron Co., 10 per cent. for puddlers. The Q. & C. Co., of Chicago, has advanced the wages of all employees an amount equalling 10 per cent.

Technical Schools.

University of Minnesota.—The February Bulletin of the Engineering College of the University of Minnesota contains certain recent modifications in the mechanical engineering course, principally in making the work in machine design more thorough and systematic, and in giving more attention to railroad work. Prof. Flather holds, however, that if too much attention is given to railroad mechanical engineering as a specialized branch in an undergraduate college course, it must be at the sacrifice of work in purely mechanical engineering lines, so, at Minnesota specialization does not begin until the senior year, and the course in railroad mechanical engineering is made a fourth-year elective. Students planning to elect this course are encouraged to work, under special arrangements, in railroad shops during the summer vacations; this plan has proved its value as preparatory to the special work of the senior year. At that time there is a systematic course of visits to the railroad shops in the vicinity; in the drafting room the design of the detail parts of locomotives and cars is studied, and the designing is supplemented by lectures, reading and recitations. Arrangements have also been made for carrying on locomotive road tests, as well as tests of locomotive appliances in the laboratory. The University is situated near the shops and headquarters of a number of large roads, which is favorable to this plan of study. Students are also free to attend the meetings of the Northwest Railway Club.

University of Illinois.—A circular issued by the State Superintendent of Public Instruction of Illinois announces that on June 2 and 3, competitive examinations for scholarships in the University of Illinois will be held at the County Court House of each county, to determine who shall be entitled to these scholarships for 1899. Question papers will be prepared at the University, and all answer papers will be returned to the University, whose authorities will decide to whom scholarships shall be awarded. For information regarding this examination, application may be made to William L. Pillsbury, Registrar, Urbana, Ill.

LOCOMOTIVE BUILDING.

The Great Northern denies that more engines are to be ordered.

The Ulster & Delaware has ordered three engines from the Schenectady Locomotive Works.

The Louisville & Nashville is about to order 11 consolidation and four 10-wheel locomotives.

The Houston & Texas Central has ordered three locomotives from the Schenectady Locomotive Works.

The Grand Rapids & Indiana has placed an order with the Baldwin Locomotive Works for building four engines.

The Chicago & Alton has placed an order with the Baldwin Locomotive Works for 40 locomotives, with an option on 30 additional. The types and details have not been settled.

In our last issue we gave a description of two engines being built by the Baldwin Locomotive Works for the Lehigh Valley. The same works now have an order to build nine more engines for the Lehigh Valley.

We are officially informed that the Missouri, Kansas & Texas has ordered 15 locomotives, 10 mogul engines from the Richmond Locomotive & Machine Co., and five 10-wheel passenger engines from the Baldwin Locomotive Works.

The Wabash has ordered, in addition to the engines referred to last week, eight engines of the mogul type from the Richmond Locomotive & Machine Works. They will weigh about 128,000 lbs., and four will be simple and four compound.

The Atchison, Topeka & Santa Fe has just ordered 15 locomotives from the Baldwin Locomotive Works for September delivery. Ten will be 10-wheel passenger, with 20 in. x 26 in. cylinders and 70-in. driving wheels, and will be equipped with electric headlights; otherwise the specifications will call for standard equipment of the road. The remaining five will be standard consolidation engines, with 21 in. x 28 in. cylinders. The road has also ordered 15 additional engines from the same works, the types and details to be settled later.

The Baldwin Locomotive Works are building 20 simple consolidation locomotives for the Norfolk & Western for March and May delivery. These are the balance of the order for 30, referred to in our issue of Nov. 4 last. They will weigh 170,000 lbs. with 150,000 lbs. on the driving wheels, and will have 21 in. x 30 in. cylinders; 56-in. drivers, radial wagon top type boilers, 200 lbs. working steam pressure, fireboxes, 110 in. long and 42 in. wide, and a tender capacity for 4,500 gals. of water and 10 tons of coal. The specifications call for Westinghouse brakes, National hollow brake beams, Tower couplers, Nathan injectors, Ashton valves, Leach sanding devices, Nathan lubricators, French springs, Ashton steam gages and Latrobe tires.

The one engine being built by the Rogers Locomotive Works for the West Virginia Central & Pittsburgh, and referred to last week, will be of the eight-wheel type, for passenger service, with 17 in. x 25 in. cylinders, 62 in. driving wheels, and a total weight of 100,000 lbs., with 65,000 lbs. on the driving wheels. The boiler will be of the radial stay extended wagon top type, 56 in. in diam., with a working steam pressure of 180 lbs. The tender will have a capacity of 3,500 gals. of water. The specifications call for Westinghouse brakes, Franklin Mfg. Co.'s sectional boiler covering, Tower couplers, Latrobe tires, Leach sanding devices, French springs, Sterlingworth brake beams and Diamond S brake shoes. No special makes of safety valves, lubricators, headlights or injectors are specified.

The Illinois Central has contracted for the 40 engines referred to in our issue of Feb. 17, the order being divided as follows: Rogers Locomotive Co., eight 10-wheel passenger and 11 10-wheel freight engines and one consolidation; Brooks Locomotive Works, six six-wheel switchers and one consolidation and 13 10-wheel freight engines. The two consolidation engines are for experimental purposes, and must haul 2,000 tons over a 38 ft. grade and five degree curves. The cylinders are to be about 23 in. x 30 in., and the weight about 220,000 lbs. The passenger engines wil have a total weight of 149,700 lbs., of which 116,800 lbs. will be on the driving wheels and 19½ in. x 26 in. cylinders; 69 in. driving wheels; Belpaire boilers; 200 lbs. steam pressure, and fireboxes, 122 in. long and 33 in. wide. The freight engines will weigh 157,200 lbs., with 122,300 lbs. on the driving wheels, and have 20 in. x 28 in. cylinders; 63 in. drivers; extended wagon top type boilers, with a working steam pressure of 200 lbs., and fireboxes, 120 in. long and 33 in. wide. The tender capacities for both the freight and passenger engines will be 5,000 gals. of water and nine tons of coal. The switching engines will weigh 115,000 lbs., and have 19 in. x 26 in. cylinders, 51 in. driving wheels, extended wagon top type boilers; working steam pressure, 165 lbs.; fireboxes, 112 in. long and 34 in. wide, and tender capacity, 3,000 gals. of water and four tons of coal. All the engines are to be equipped with Westinghouse brakes, Monarch brake beams, Ross-Meehan brake shoes, McKeen couplers, Leach sanding devices, Nathan lubricators, French springs and pneumatic blow-off cocks. The passeger engines will be equipped with half Sellers' Improved injectors and half Hancock inspirators, and the freight engines half Ohio and half Nathan injectors.

CAR BUILDING.

The Chicago & Northwestern has ordered 400 cars from the Wells & French Co.

The Chihuahua & Pacific is in the market for 15 flat cars for immediate delivery.

The Erie last week ordered 1,000 more standard box cars from the Michigan-Peninsular Car Cc.

The Pittsburgh & Lake Erie has issued specifications for 500 coal cars of 80,000 lbs. capacity.

We are officially informed that the American Steel & Wire Co. is considering buying some freight cars.

The Central Car Trust Co. has placed an order for building 100 cars with the Youngstown Car Mfg. Co.

The Summers Coal Co., of Cleveland, O., has ordered 200 coal cars from the Youngstown Car Mfg. Co.

We are reliably, but not officially, informed that the Mexican Central is preparing plans for new passenger cars.

It is reported that the Chicago & Alton will place some large orders for cars, but we have no official information.

The Lake Shore & Michigan Southern has sent out specifications for 500 box cars and 500 coal cars of 80,000 lbs. capacity.

The Consolidated Car Co. has ordered 400 box cars from the American Car & Foundry Co., to be built by the Michigan-Peninsular Car Co.

The Chicago, Lake Shore & Eastern on March 7 placed an order with the Pressed Steel Car Co. for building 150 steel cars of 100,000 lbs. capacity.

It is reported that the Terre Haute & Indianapolis (Vandalia Line) has ordered 100 of the coal cars referred to last week from the Terre Haute Car & Mfg. Co.

The Northern Pacific has ordered 100 hopper-bottom gondola cars from the American Car & Foundry Co., to be built at the works of the Michigan-Peninsular Car Co.

With reference to the report published in several papers to the effect that the Rutland is in the market for cars, we are officially informed that the road does not contemplate placing orders at present.

The Wheeling & Lake Erie is preparing drawings and specifications for coal and flat cars of 60,000 lbs. capacity and steel cars of 80,000 lbs. capacity, but it is yet uncertain how many will be ordered.

The St. Louis, Peoria & Northern has ordered 1,000 box cars from the Mt. Vernon Car Mfg. Co., in addition to the 1,000 coal cars ordered from the Georgia Car & Mfg. Co., and referred to in our last issue.

The 600 box cars for the Minneapolis & St. Louis, referred to last week, will be built at the works of the Missouri Car & Foundry Co. One hundred flat cars will also be built by the Terre Haute Car & Mfg. Co.

It is reported that the Pennsylvania order for 500 box cars, referred to last week, will be supplemented by orders for several thousand cars of different kinds, probably including more steel cars. This has not been officially confirmed.

The Atchison, Topeka & Santa Fe has issued specifications and asked four or five builders to bid within the coming week on 1,000 box cars to be 40 ft. long and of 80,000 lbs. capacity, for July and August delivery. The order will soon be placed.

We are officially informed that the cars for the Missouri, Kansas & Texas, noted in our issue of last week, will include 1,200 box, 200 refrigerator, 300 coal and 300 furniture cars, and possibly five chair cars. Bids are about to be asked as we go to press.

The order for cars placed by the Lake Superior & Ishpeming with the Pressed Steel Car Co. and noted last week, is for 50 steel ore cars of 100,000 lbs. capacity for July delivery. These cars will weigh 28,800 lbs. and will be 22 ft. long, 8 ft. wide and 9 ft. high, and will be equipped with Tower couplers and air brakes.

The order for 1,000 cars, placed by the Lake Erie & Western with Haskell & Barker, as stated in our issue of Feb. 24, calls for 950 box and 50 stock cars for May, June and September delivery. They will have a capacity of 60,000 lbs., will weigh 30,000 lbs. and measure 36 ft. long and 7 ft. 6 in. high, and be equipped with metal trucks, bolsters, brake beams and roofs, and Lone Star couplers.

The 200 ore cars ordered Feb. 27 by the Duluth & Iron Range from the Illinois Car & Equipment Co., as noted last week, will be of 60,000 lbs. capacity and are for May delivery. They will have iron axles, archbar trucks, Barber bolsters, National hollow brake beams, Tower couplers, Bryan draft rigging, malleable iron journal boxes and lids, Princess mineral paint, Scott springs, cast iron brake shoes and Griffin wheels. The brakes and brasses will be furnished by the railroad company.

The Minneapolis & St. Louis ordered on Feb. 25 600 box and 200 flat cars from the American Car & Foundry Co., to be built by the Michigan-Peninsular Car Co. These cars are all of 60,000 lbs capacity and for July delivery. The box cars will be 34 ft. long and the flat cars 36 ft. long. They will have Fox trucks and Fox bolsters, Westinghouse air brakes, Lappin brake shoes, metal brake beams, Ajax brasses, Standard couplers, Dunham door fastenings, Butler draft rigging, McCord journal boxes and lids, Winslow roofs and French springs.

The 1,000 cars ordered by the Lehigh Valley from the American Car & Foundry Co., to be built at the Michigan-Peninsular Car Co.'s works, and referred to last week, will be King hopper bottom gondolas of 80,000 lbs. capacity for July and August delivery. They will weigh 35,000 lbs., measure 29 ft. 6½ in. long, 8 ft. 5½ in. wide, and 5 ft. 10½ in. high inside, and 10 ft. high from rail to top of body. The specifications included M. C. B. 5 in. x 9 in. steel axles, Fox pressed steel bolsters and trucks, Sterlingworth brake beams, Christie brake shoes, Westinghouse air brakes, Tower couplers, Graham draft rigging, 5 in. x 9 in. M. C. B. malleable iron journal boxes, with pressed steel lids, Patterson-Sargent paint, L. V. Standard springs and 33 in. chilled wheels.

The Trenton, Lawrenceville & Princeton Railroad will, in about two weeks, ask bids for building four open and eight closed motor cars. Wm. B. Parry, 25 Forst-Richey Building, Trenton, N. J., is General Manager and Purchasing Agent. (See Electric Railroad Construction column.)

BRIDGE BUILDING.

ALBANY, N Y.—The House has passed the bill for a bridge over Onondaga Creek at West Fayette St. (Jan. 27, p. 70.)

ATHENS, GA.—A bridge will be built across the Oconee River, estimated to cost $2,500, by J. W. Barrett, City Engineer.

BELLEFONTAINE, O.—C. D. Campbell, County Auditor, will receive bids until March 21 for the superstructure of the Kiblinger bridge.

BREWTON, ALA.—The Senate has passed the bill authorizing three bridges across Conecuh River. Wm. J. Jackson, Treasurer, Escambia County.

BUFFALO, N. Y.—The Delaware, Lackawanna & Western RR., according to report, has been notified by the Supreme Court to rebuild its overhead crossing on Main St., near the city line.

CHICAGO, ILL.—The Board of Trustees of the Sanitary District have agreed to pay one-half of the cost of a new bascule bridge over the Chicago River at South Canal St. The River Improvement Association has been informed of this, and an effort will be made to have the city pay the other half of the expense, so that the bridge may be built during the coming summer.

The Chicago & Alton will rebuild some bridges in connection with the contemplated improvements. (See Railroad Construction column.)

COLUMBUS, O.—W. H. Halliday, County Auditor and Clerk to the Board of County Commissioners, wants proposals April 1 for the (1) bridge over the Big Walnut Creek, on the Winchester Turnpike, Madison Township; (2) bridge at the Carruther's farm, Sharon Township; (3) bridge over Early Run, on Harrisburg Pike, Franklin Township; (4) bridge over run at Urbancrest, Harrisburg Pike, Jackson Township. The plans, estimates and specifications are on file in the County Auditor's office.

According to report, the Pittsburgh, Cincinnati, Chicago & St. Louis, in connection with improvements west of Columbus from Mound's to Hayden's, will renew the bridge across the Scioto River at a probable cost of $50,000.

CONSHOHOCKEN, PA.—The County Commissioners have been petitioned for a bridge over the railroad crossing in West Conshohocken.

CONWAY, S. C.—(See Electric Railroad Construction column.)

DARLINGTON, IND.—According to report, the St. Louis, Vandalia & Terre Haute will build two iron bridges, one over the Walnut Ford and the other over Sugar Creek.

DENVER, COL.—According to report, a bridge will be built across the Platte River at Mississippi St., at an estimated cost of $2,000. H. C. Lowrie, Engineer Board of Public Works. (March 3, p. 159.)

GENESEO, N. Y.—The Erie RR., according to report, will build a new iron bridge across Canaseraga Creek, between this place and Mt. Morris.

HUTCHINSON, KAN.—The Hutchinson & Southern, according to report, will build a bridge across the Arkansas River.

KANSAS CITY, MO.—The Metropolitan Ry. Co. has secured legislative permission to build a viaduct along Eighth St., from Walnut to Wall. (See Electric Railroad Construction Column.)

KINGSTON, TENN.—The Tennessee Central RR. has asked $25,000 of the city of Kingston to aid in building the bridge across Clinch River.

LEWISBURG, PA.—The Lewisburg & Buffalo Valley RR. bridge, across Buffalo Creek, four miles from Gulp's Landing, collapsed on Feb. 22, while a train was passing.

LINDSAY, ONT.—According to report, the City Council will build a new bridge across the river at the foot of Ridont St.

LOS ANGELES, CAL.—The bridge across the river at Aliso St., will be removed to the new site and be replaced by a new structure.

MADISON, WIS.—The Legislature has passed the bill authorizing the Menasha Woodenware Co. to build a bridge across Fox River.

NEW WHATCOM, WASH.—B. W. Huntoon, County Surveyor, will receive bids April 1, for a 120-ft. span bridge across the south fork of the Nookack River.

OAKLAND, CAL.—Two bridges will soon be built across the tidal canal at Fruitvale Ave. and Hight St.

OTTO, N. Y.—A bridge will be built over a branch of the Cattaraugus Creek between the towns of Persia and Otto in Cattaraugus County. Floyd W. Holmes is Commissioner of Highways of the town of Otto.

PETERSBURGH, ONT.—The County Council is about to prepare plans for rebuilding the Mud Lake bridge, at an estimated cost of $10,000.

PITTSBURGH, PA.—The Allegheny Valley RR. will build a new structure at West Penn Junction, to cost about $100,000, to replace the bridge recently destroyed by an ice floe.

According to report, Loughlin & Co., Ltd., will build an overhead bridge across Second Ave., to connect with the Baltimore & Ohio.

The Pressed Steel Car Co., according to report, will build a bridge across the Ohio River.

POCOMOKE, MD.—The New York, Philadelphia & Norfolk, RR. will build a steel bridge to replace an old wooden structure, which now spans the Pocomoke, at an estimated cost of $75,000.

QUEBEC, QUE.—The Carnegie Steel Co., the Phœnix Bridge Co. and the Union Bridge Co., of New York, bid for the construction of the new bridge at Quebec. This bridge, with approaches and preliminary expenses, is estimated to cost, when finished, nearly $5,000,000. (Jan. 27, p. 71.)

RUTLAND, VT.—The following bids were received March 4, for four bridges on Rutland-Canadian RR.:

Estimated quantities—

For draw bridges, riveted work	997,500 lbs.	(a)
" machinery	36,300 "	(b)
" iron castings	41,400 "	(c)
" steel castings	24,300 "	(d)
For fixed bridges, riveted work	579,000 "	(e)

All Bids for Prices Per Pound, Erected in Place.

	(a)	(b)	(c)	(d)	(e)
King Bridge Co.	3.80	10.00	5.00	6.00	3.80
New Jersey Steel & Iron Co.	3.78	7.10	6.00	9.00	3.78
Berlin Iron Bridge Co.	3.77	8.00	6.50	8.00	3.75
Elmira Bridge Co., Ltd.	3.75	7.00	6.00	8.50	3.75
Rochester Bridge & Iron Works.	3.72	6.80	5.625	9.00	3.67
*Edge Moor Bridge Works	3.66	7.10	6.00	9.00	3.63

*Awarded contract.

SCHENECTADY, N. Y.—According to report, the New York Central and the West Shore will build a new bridge over the Mohawk River, near Schenectady.

SHEFFIELD, TENN.—The President has approved the bill for building a bridge over the Tennessee River at or near Sheffield, by the Tennessee Bridge Co. (Jan. 13, p. 31; Jan. 20, p. 50.)

SOMERSET, KY.—William M. Catron, Judge of Pulaski County, will receive bids until March 15 for three iron or steel highway bridges.

SOMERVILLE, MASS.—Chief Engineer A. S. Cheever, of the Fitchburg RR., has submitted plans for the new iron bridge crossing on Beacon St.; also for the one in Cambridge, on Massachusetts Ave. (Feb. 3, p. 91.)

SYRACUSE, N. Y.—(See Electrical Railroad Construction column.)

TOLEDO, O.—Willis F. Brown, City Civil Engineer, informs us that he has been instructed by the Committee on Bridges, to secure plans and estimates for a bridge to be built at Lafayette St., Toledo.

TRENTON, N. J.—(See Electric Railroad Construction column.)

WASHINGTON, PA.—The County Court has approved of the new bridge over Craft Creek, in Morris Township, on the road from Sparta to Pleasant Grove.

WEAVERSVILLE, VA.—G. M. Bastable, H. P. Wait and U. S. Martin, Warrenton, Pa., have been appointed Commissioners to receive proposals for a new bridge over Cedar Run.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Atlantic Coast Line.—Common, 2 per cent., payable March 10.

Boston & Albany.—Quarterly, 2 per cent., payable March 31.

Boston & Maine.—Quarterly, 1½ per cent., payable April 1.

Chicago & Eastern Illinois.—Preferred, quarterly, 1¼ per cent., payable April 20.

Chicago, Indianapolis & Louisville.—Preferred, 1 per cent.

Cleveland, Cincinnati, Chicago & St. Louis.—Preferred, quarterly, 1¼ per cent., payable April 20.

Little Miami.—First preferred, 3 per cent., payable in April.

New York & Harlem.—Preferred and common, 2 per cent., payable April 1.

New York Central & Hudson River.—Quarterly, 1 per cent., payable April 15.

Norfolk & Western.—Semi-annual preferred, 2 per cent., payable Feb. 24.

Piedmont & Cumberland.—Two per cent., payable April 15.

Portland & Rumford Falls.—Quarterly, 1 per cent., payable March 15.

West Jersey & Sea Shore.—Semi-annually, 2½ per cent., payable March 15.

West Virginia Central and Pittsburgh.—One half per cent., payable March 16.

Buffalo & Niagara Falls Electric.—Quarterly, 1 per cent., payable March 15.

Buffalo Ry.—Quarterly, 1 per cent., payable March 15.

North Shore Traction.—Quarterly, 3 per cent., payable April 1.

Philadelphia Traction.—$2 per share.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month, at 8 p. m.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, Secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month, except during July and August.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Tuesday of each month, excepting July and August, at 6.30 p. m.

Engineers' Club of Columbus, (O.)—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.—Meets at the house of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.

Locomotive Foremen's Club.—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.

New England Railroad Club.

The annual meeting will be held in Pierce Hall, Boston, Tuesday, March 14. Mr. C. C. Ellwell, Superintendent of the Norwich Division of the N. Y., N. H. & H. RR., will give a talk upon European railroads, illustrated with the stereopticon.

New York Railroad Club.

The regular meeting will be held at 8 p. m., on Thursday, March 16, at the rooms of the American Society of Mechanical Engineers, 12 West 31st street, New York City.

The discussion will be upon the paper presented at the last meeting, subject, "The Settlement of Car Hire Account on Per Diem or Mileage Basis," by Mr. J. M. Daly, Superintendent of Transportation, Illinois Central RR.

St. Louis Railway Club.

The next meeting of the St. Louis Railway Club will be held Friday, March 10th, 3 p. m., in the parlors of the Southern Hotel.

A paper by Mr. C. O. Scranton of the Alliance & Northern Railway Co., entitled "Commerce in Roman Times," will be presented. A member of this club is preparing a paper entitled "The Commerce of the 19th Century," which will be presented in the near future.

The discussion will be on "The Organization of a Railway Engineering Department," by Mr. Willard Beahan.

Engineers' Club of St. Louis.

The 486th meeting was called to order at 8:20 p. m., March 1, 1899, President Colby in the chair. Thirty-one members and six visitors were present.

Col. E. J. Spencer read the paper of the evening, entitled, "World's Fairs." The histories of previous expositions, international in their character, were briefly gone over, and mention made of some of their main features. The cost, financial success and attendance of all these were given, and some comparisons made, showing the relative sizes. The growth of electric lighting was traced through the later fairs. A large number of lantern slides were shown, illustrating the various architectural and engineering features of the Paris, 1889; Columbian, 1893, and Omaha, 1898, Expositions. Some interesting statistics of the number of people attending the Paris Exposition, and the estimated amount of money which the visitors brought, were read.

Mr. Julius Pitzman made some remarks on the prospective Louisiana Purchase Exposition, giving the reasons for holding it and explaining what special legislation is necessary to successfully accomplish it. He also said that it was highly important to make it entirely different from the Chicago Fair.

American Society of Mechanical Engineers.

An informal reunion was held at the Society House on Tuesday evening of this week. Mr. B. C. Ball, Chairman of the Executive Committee of the Junior Members, appointed by Mr. S. W. Baldwin at the last meeting, presided. Mr. F. E. Frothingham, Secretary of this committee, reported on the work thus far undertaken, and of the proposed meetings of the Junior members. In and about New York there are about 80 juniors, in Chicago 20, and less numbers in other cities. In order to have those away from New York receive in a measure the benefit of these gatherings, the committee proposes to have the papers and discussions prepared for distribution and sent to members on request.

Mr. Jesse M. Smith spoke of the proposed work of the Junior section and of the benefit that should result from the efforts that are now being made.

The features of the evening were the addresses of Gardner C. Sims, Chief Engineer, and Lieutenant W. S. Aldrich of the U. S. S. Vulcan. Many lantern slide views were shown, giving a notion of the part the Vulcan had in the war, principally before Santiago, and of the equipment of this repair ship which did such valuable service. Mr. Sims referred more especially to the battle at Santiago, to the effect our shells had on the Spanish vessels, and to the efforts to restore the sunken ships. Mr. Aldrich spoke of the difficulty of doing some of the repair work and showed views illustrating the castings that were made on this ship, and of the large variety of work that was expected of the engineers on the Vulcan. One could not doubt after listening to these addresses, the important part a repair ship has in modern naval warfare.

The next meeting of the society will probably be held the first Tuesday evening in April, the particulars of which will be given later. Many of the older members of the society were in attendance at the meeting Tuesday evening.

The Civil Engineers' Club of Cleveland.

At the semi-monthly meeting held on Feb. 28, Mr. Jos. R. Oldham, Naval Architect, Member of the Club, read a paper entitled, "The Rise and Fall of the American Merchant Marine."

He said that there is no need of anxiety concerning our lake, coast and river trades, as these are in a prosperous condition, and are quite able to take care of themselves. Our foreign trade reached its maximum in the year 1861, at which time our total tonnage was 5,539,813 tons; the British tonnage that year was 4,808,826 tons. Since that time our Merchant Marine has steadily declined. In addition to the disturbing element of the civil war in America, there was an equally disturbing mechanical element due to the inauguration of screw propulsion for the ocean trade which began to be generally adopted in Europe about the year 1860. We then had to import iron, and also had to pay dearly for labor, so we were not in a position to build and operate successfully iron steamers to carry our mails. Forty years ago as much as $200 a ton was paid in London for the steel with which to build a steamer. Now that the initiatory step has been taken toward the construction of a large and deep waterway to the Atlantic, our lake ship builders, ship owners and merchants will probably realize the necessity for such a measure as that proposed by Senator Hanna for creating a large modern mercantile marine. We are now in a position to contract with Europeans for steamers carrying from 2,000 to 3,000 tons. Let the American ship owners be compensated, so as to be on an equality with the foreign ship owner and in less than twenty years we shall see more than one hundred large steel shipbuilding and marine engineering establishments in this country turning out, as others are now doing, $100,000,000 worth of steam tonnage per annum. All that has prevented American steel from competing with the British article has been the high freights ruling from the other side. When these are reduced large quantities of steel will be exported from America.

PERSONAL

(For other personal mention see Elections and Appointments.)

—Hon. A. E. Caffee, of Marion, Ala., and Hon. O. Kyle, of Decatur, Ala., have been appointed State Railroad Commissioners, succeeding Messrs. Harvey E. Jones and Ross C. Smith.

—Captain William Craighill, Corps of Engineers, U. S. A., was on Feb. 28 assigned to duty as assistant to the Engineer Commissioner of the District of Columbia. Capt. Craighill graduated from the Military Academy in 1885.

—Mr. George H. Bimple, Superintendent of the Central Division of the Adams Express Co., died at Zanesville, Ohio, Feb. 27, aged 71. Mr. Bimple had served in responsible positions with the Adams Express Co. since about 1858, and at the time of his death his jurisdiction included all routes between Pittsburgh, Cincinnati and Chicago.

—Prof. W. F. M. Goss, of Purdue University, has been granted a leave of absence and intends to spend from six to eight months in England and on the Continent, leaving New York the first week in April. Prof. Goss has now been at Purdue 20 years, and this trip is in the nature of a vacation. Prof. R. A. Smart will be in charge of the department during his absence.

—Mr. Albert G. Blair, President of the Wheeling & Lake Erie R. R., since Feb. 12, 1896, has resigned. Mr. Blair entered railroad service as bill clerk with the Toledo, Wabash & Western. In 1882 he became general freight agent of the W. & L. E., in 1889 traffic manager and in 1892 general manager, finally becoming president, which position he held until the time of his resignation.

—Mr. Alexander Kearney has been appointed Assistant to Mr. F. D. Casanave, General Superintendent of Motive Power, Pennsylvania Railroad, with headquarters at Altoona. Mr. Kearney began his railroad life as an apprentice in the Altoona shops, going through the various shops and mechanical departments. After finishing his apprenticeship he was appointed Assistant Road Foreman of Engines on the Philadelphia Division, and later he became Assistant Engineer of Motive Power of the Philadelphia, Wilmington & Baltimore, his latest position being Assistant Engineer of Motive Power of the United Railroads of New Jersey. He has by hard and intelligent work earned the reputation of being a capable railroad man, with excellent organizing ability.

—Mr. Fred C. Weir died at his home in Cincinnati Wednesday, March 1, at the age of 64 years. Mr. Weir was President of the Weir Frog Company, and in that way has been well known to railroad men for many years. He was also a civil engineer and a member of the American Society of Civil Engineers, and used to be a familiar figure at their conventions and annual meetings. Mr. Weir was a man of fertile and active mind and considerable mechanical knowledge and ability, and had achieved success. He was a genial and sociable man, and a kind man, and, hence, very popular. He was a member of the Loyal Legion, of the Sons of the American Revolution, the New England Society of Cincinnati and the Cincinnati Chamber of Commerce. He was also an active and prominent Mason.

—Mr. Herbert Steward died at his home in New York last Saturday. He was born in New London, Conn., in October, 1847. He had a public school education and took employment in a bank, but when he was 22 he decided to fit himself for business as an engineering contractor. He secured employment under the contractor for the Girard avenue bridge in Philadelphia during its construction. He was employed by Messrs. Clarke, Reeves & Co., in the building of the Metropolitan Elevated Railroad in New York, and later was associated with Mr. Myles Tierny in building the Washington Bridge over the Harlem River. Among some of the large bridges built by Mr. Steward, either alone or as a member of the firm of Steward & McDermott, are the following: At Marysville on the Pennsylvania Railroad; at Fairmount Park, Philadelphia; the 155th Street viaduct in New York City, and the masonry of the Macomb's dam bridge, New York City. Mr. Steward was a man of high standards and of generous character, and withal a modest and companionable man. He was keenly interested in the prosperity of the engineering profession, and helped materially in building the new House of the American Society of Civil Engineers. He was a member of that Society and of the New England Society, a Manager of the Engineers' Club, and a member of the Colonial and other clubs.

—Mr. William Ledyard Cathcart has been appointed Adjunct Professor of Mechanical Engineering in Columbia University, which appointment was mentioned in our notes of technical schools a few weeks ago. It seems appropriate, however, to say a few words about Mr. Cathcart himself, and the possibilities which open up from his appointment. Mr. Cathcart was appointed cadet engineer at the Naval Academy in 1873 and went to sea in 1875 and sailed in various warships from that time until 1881. He became Assistant Engineer U. S. N. in 1877 and passed his examination for the grade of Past Assistant Engineer in 1884. He was on inspection duty at Philadelphia from 1881 to 1884, then had three years more of sea duty, and was again put on inspection duty. In 1891 he resigned from the Navy to go into private business, and in 1897 was made Instructor of Marine Engineering at Webb's Academy, Fordham. At the breaking out of the war with Spain he volunteered for service and was appointed Chief Engineer June 10, 1898, and put on duty in the Bureau of Steam Engineering. In October he was discharged, and in February was appointed Adjunct Professor of Mechanical Engineering at Columbia. He takes up his duties there next October. We do not learn that this means the immediate inauguration of special courses in marine engineering and naval architecture, but we can well imagine that such courses are among the plans of the trustees. It is apparent that the day is not far distant when the young men of America will be looking eagerly for more of this kind of training than they get in civil schools, and the Naval Academy will not be able to provide for all of those who wish to prepare themselves for marine engineering and naval architecture. It has long seemed inevitable that the development of our mercantile and naval marine must again go forward, making us the greatest maritime power in the world. The conditions which caused the decline of our marine are fast passing away, if, indeed, they have not already passed. The civil war, which swept away our ships, was only one of these conditions. Our people found greater profit and attraction in developing the continent than in the carrying trade, but it seems as if the time had come when our money and energies would again seek an outlet in ocean commerce, and it is obvious enough that if we retain the Philippines our navy must have a great development. Assuming that all of these things are so, what is more natural than that Columbia University, situated in the greatest seaport of the world, should lead among the civil schools in the education of young men for building and maintaining ships and marine engines?

—Mr. Samuel Sloan, the retiring President of the Delaware, Lackawanna & Western, is a remarkable figure in the railroad field. In his 82d year, and after more than 40 years of presidency of this, and other railroads, he is still in great vigor of mind and body. Mr. Sloan was born on Christmas Day in 1817, in the village of Lisburn, Down County, Ireland. His father came to this country and became a resident of New York City, when the boy was but two years old. When he was but 14 years old his father died, and he immediately withdrew from the Columbia College Preparatory School, and entered the importing house of McBride & Co., then on Cedar street, as a junior clerk. There for more than 20 years he served with promptness, faithfulness, energy and honesty. At various times during these years he had some experience in political life, and in 1857 he consented to run as State Senator of the Second District, which included the City of Brooklyn. Though ordinarily a Republican district, Mr. Sloan was elected on the Democratic ticket by over 1,400 majority. During his Senatorship the firm of McBride & Co. dissolved and this marked the beginning of Mr. Sloan's devotion to railroad interests. He was a friend of the projector of the Hudson River Railroad, which has since been absorbed into the New York Central & Hudson River, and in 1855 was made a Director, and during the same year its President. Two years later, upon the completion of his Senatorial term, he devoted his whole energy to that property, and when he retired from the presidency in 1864, the values of the shares had risen from $17 to $140, and the road was earning and paying good dividends. When Commodore Vanderbilt bought the controlling interest in the road, he offered its presidency to Mr. Sloan, who preferred, however, to have an independent management. He acted for several months as arbitrator and commissioner of the four trunk lines then existent. He was elected in 1864 a Director, and three years later President of the Delaware, Lackawanna & Western, a position which he has held for over 31 years. Born and raised a Scotch Presbyterian, he has carried his faith into his business, and even to-day the Lackawanna has the peculiar distinction of running no local Sunday trains. Under the management of Mr. Sloan, the Lackawanna connections were extended in all directions, forming a great system connecting with the heart of the Pennsylvania coal region. In the course of time 30 short lines were absorbed into the main road and at a cost of many million dollars the line was extended West to Buffalo. At varying times he has been President of the Rome, Watertown & Ogdensburg, the Michigan Central, the Ft. Wayne & Jackson, the Marquette, Houghton & Ontonagon and the International & Great Northern. For several years he was closely associated with Mr. Gould, and is to-day a Director in the Western Union Telegraph Co., in the Missouri Pacific, and in the Texas & Pacific railroads. He is Director and member of the executive committee of the Manhattan Railway.

ELECTIONS AND APPOINTMENTS.

Atlantic & North Carolina.—James A. Bryan has been elected President.

Atlantic, Valdosta & Western.—W. H. Carroll has been appointed Auditor, with headquarters at Jacksonville, Fla., succeeding R. H. Brent, resigned. W. Frazier Jones has been appointed Assistant Treasurer, suceeding Geo. Graham, resigned.

Baltimore & Ohio.—Michael D. Wild has been appointed Secretary of the Baltimore & Ohio Southwestern, succeeding Edward Bruce, and Assistant Secretary of the B. & O., with headquarters at 2 Wall St., New York.

Central of New Jersey.—William McIntosh has been appointed Superintendent of Motive Power, succeeding C. A. Thompson, resigned. Effective March 9.

G. W. Twining has been appointed Engineer of Maintenance of Way, with headquarters at Mauch Chunk, Pa., and W. W. Wentz, Jr., Division Superintendent of Transportation Department.

Central of Pennsylvania.—Chas. M. Clement has been elected President, with headquarters at Bellefonte, Pa.

Columbia Southern.—D. C. O'Reilly having resigned, the duties of General Manager will be assumed by President E. E. Lytle.

Erie.—A. T. Cuddleback has been appointed Auditor of Traffic, succeeding E. P. Campbell, of New York, resigned.

G. A. Thompson has been appointed Superintendent of the Delaware Division, succeeding W. L. Derr, transferred to the Susquehanna Division. W. H. Barrett has been appointed Superintendent of the Rochester Division.

Fall Brook.—James Collord has been appointed Auditor, with headquarters at Corning, N. Y., succeeding Wm. Nicholson, who has left to become Manager of the Buffalo Railway Clearing House.

Hocking Valley.—The new officers of this company, successor to the Columbus, Hocking Valley & Toledo, referred to in the Railroad News Column, are: President, N. Monsarrat; Secretary and Treasurer, W. N. Cott; Assistant Secretary and Treasurer, A. H. Gillard; General Counsel, James H. Hoyt, and Auditor, Louis P. Ecker. The office of Traffic Manager has been abolished.

Iowa Central.—Marquis Barr has been appointed Claim Agent, with headquarters at Marshalltown, Ia., succeeding L. S. Stedman.

Humeston & Shenandoah.—H. S. Nelson, heretofore General Passenger and Freight Agent, at Clarinda, Ia., has been appointed Superintendent. E. C. Murphy has resigned, and the office of General Manager has been abolished.

Illinois Central.—The two divisions (Vicksburg and New Orleans) of the Yazoo & Mississippi Valley were recently consolidated, with headquarters at Wilson, La., and T. P. Bellows has been appointed Trainmaster.

Kansas, Missouri & Northern.—The officers of this company, referred to in the Construction Column, are: President, Robert Doubleday, New York; First Vice-President, R. A. Reese, St. Louis; Second Vice-President, Maco Stewart, Galveston, Tex.; Secretary, C. C. Brown, San Antonio, Tex., and Jules Borteo, St. Louis, Auditor. These gentlemen, with Alex. Konta, of St. Louis, are the incorporators.

Kentucky & Indiana Bridge Co.—The offices of Trainmaster and Master Mechanic being abolished, C. D. Ayres and J. F. Newhouse will become Yardmaster and Foreman of Shops, respectively.

Minneapolis, St. Paul & Sault Ste. Marie.—C. P. Eckles has been appointed Superintendent of the Minnesota Division, with headquarters at Enderlin, N. D., suceeding F. C. Batchelder, transferred.

Mobile & Ohio.—D. W. Buhl, Division Freight Agent, has been appointed General Agent for Cuba, with headquarters at Havana.

Newfoundland.—The following are the officers of this company: Proprietor, R. G. Reid; General Manager, W. D. Reid; Assistant General Manager, H. D. Reid; Superintendent, R. G. Reid, Jr.; Chief Engineer, G. H. Massey; Treasurer, H. S. Cormack; Freight and Passenger Agent, H. A. Morine; Auditor, H. M. McNeil, and Purchasing Agent, H. Crawford. All offices to be at St. John's, N. F.

New York, New Haven & Hartford.—James Hocking has been appointed Master Mechanic, with headquarters at New Haven, Conn., succeeding J. W. Leary, resigned.

Oregon Short Line.—Comptroller Charles A. Hubbard has been elected Secretary.

Plant System.—The jurisdiction of W. E. Symons, Superintendent of Motive Power, is to be extended over the Car Department.

Port Angeles & Eastern.—The officers of this company, referred to in the Construction Column, are: President, C. A. Cushing; Vice-President, I. C. Atkinson, Boston; Treasurer, Arthur Shute, Ellsworth, Me.; Secretary, John Lehman, Chicago; Superintendent of Construction, Wm. Martell, Port Angeles, Wash.

Rutland.—The following appointments took effect Feb. 13: C. L. Pierce, General Superintendent; H. A. Hodge, Traffic Manager, and W. P. Luttrell, Car Accountant. J. F. Carrigan was made Trainmaster of the Ogdensburg & Lake Champlain.

St. Louis & Memphis.—The new officers of this company are: President and General Manager, Seth S. Barnes, New Madrid, Mo.; First Vice-President, Edward De Lisle, Portageville, Mo.; Second Vice-President, A. De Lisle, Portageville, Mo.; Treasurer, Laura Barnes, New Madrid, Mo.; Secretary, W. A. Barnes, New Madrid, Mo., and Superintendent, Chas. M. Barnes, New Madrid, Mo.

San Antonio & Gulf.—E. E. Shackford has been appointed General Manager, with headquarters at San Antonio, Tex., succeeding George Dullnig, resigned.

San Diego, Pacific Beach & La Jolla.—The new officers of this company, referred to in the Railroad News column, are: President and General Manager, Graham E. Babcock; Vice-President, Chas. T. Hurde; Secretary, Joseph A. Flint. The central office is San Diego, Cal.

Tavares & Gulf.—Hon. Cecil G. Butt has been appointed General Counsel, with headquarters at Orlando, Fla., succeeding Robert McNamee, resigned.

Waycross Air Line.—Alexander Bonnyman has been appointed Superintendent, with headquarters at Waycross, Ga., succeeding L. Johnson, resigned.

RAILROAD CONSTRUCTION,
New Incorporations, Surveys, Etc.

ARKANSAS CENTRAL.—Track laying is reported begun on the extension to Paris, Ark., 18 miles. (Feb. 17, p. 131.)

ATCHISCON, TOPEKA & SANTA FE.—The Gulf, Colorado & Santa Fe line is building a new track about six miles long around Gay Hill, Tex., and extending to the Yegua River.

ATLANTIC COAST LINE.—The South Carolina Legislature has passed a bill, approved Feb. 28, chartering the Wilson & Summerton Co., to build the extension of the A. C. L. from Sumter, S. C., north 31 miles to Camden. (Feb. 3, p. 92.)

BANGOR & AROOSTOOK.—On the Piscataquis Division, which extends from Oldtown, Me., to Greenville, 77 miles, the company is expending $275,000 in improvements. Three long wooden bridges are being replaced with steel in the city of Oldtown. On the northern end of the division, six to 20 miles south of Moose Head Lake, eight trestles are being filled in, and one 60 ft. high is being replaced with a steel viaduct. The work will be largely or wholly done by the company. (Feb. 17, p. 131.) There was recently issued $1,500,000 of new bonds, of which $1,225,000 was to replace old bonds, and the remaining $275,000 to be applied on improvements. (Official.)

BENNETTSVILLE & OSBORNE.—The South Carolina Legislature has passed a bill approved Feb. 27, incorporating this company with a capital stock of $100,000, to build a line from Bennettsville, Marlboro County, to a point at or near Osborne, Richmond County, in the State of North Carolina. Among the incorporators are C. S. McCall, H. H. Newton, H. K. Odom and T. B. Moore.

BRUNSWICK & ALBANY.—Application is made in Georgia to incorporate this company to build a line from Offerman, on the Plant System, to run west about 30 miles to Albany, and crossing the Waycross Air Line. A lumber road running from Offerman west several miles, and along by the Southern Pine Co., of which J. J. McDonough, of Offerman, is President, is to be rebuilt and used in part.

CHEAT VALLEY.—New contracts are reported let for the continuation of this line, and grading is to be pushed as rapidly as possible. The line as projected is from Rawlesburg, W. Va., to Point Marion, and several miles of track was laid last year. J. J. Stoer of Rawlesburg is President. (Aug. 26, 1898, p. 618.)

CHESAPEAKE & OHIO.—This company has petitioned the Council of Richmond, Va., for the re-enactment of the ordinance, approved June 17, 1896, authorizing the building of certain viaducts, the closing and bridging of certain streets and the lowering of the free bridge. This we suppose is resuming the project for an elevated structure through the city.

CHICAGO & ALTON.—Vice President and General Manager C. H. Chappell is quoted as saying that the new syndicate which has bought the property will expend many millions in reducing grades and improving the line wherever needed.

A dispatch to this office from Chicago, states that it is reliably reported that the roadbed will be reballasted, new rails laid, bridges rebuilt, where necessary, and the line levelled, straightened and shortened by new connecting links and some short extensions.

CHICAGO & NORTHWESTERN.—Work will be begun as soon as the frost is out of the ground on the double track from Council Bluffs to Tama City, Ia. Second track was laid as far as Tama City from the east last year.

CHICAGO, WHEATON & AURORA.—This company was incorporated in Illinois Feb. 25, with a capital stock of $10,000, to build a line from Chicago west about 35 miles from Wheaton to Aurora. The incorporators are: Andrew J. Hirschl, James Rosenthal, Lessing Rosenthal, Milton A. Strauss, Leon A. Strauss. First Board of Directors: Andrew J. Hirschl, William A. Rogan, Morris Schuhmann, F. J. Houlihan, A. D. Wiener.

COLUMBUS, BLOOMINGTON & TERRE HAUTE.—Preliminary surveys are reported begun on this proposed line from Columbus, Ind., west about 85 miles via Bloomington to Terre Haute. It will require about 30 days to complete the surveys and to file petitions before the Commissioners of each county through which the road passes to order an election for a vote on a 2 per cent. tax.

COLUMBUS, MARSHALL & NORTHEASTERN.—This company, recently referred to in this column (Oct. 28, p. 786), has been incorporated in Michigan, with a capital stock of $1,200,000. The line as proposed is from Marshall, Mich., to run north about 140 miles via Olivet, Kalamazoo, Vermontville, Muir and Alma to Bay City. The directors of the company are: C. E. Sawyer, C. W. Robinson, and H. E. Hallon, of Marshall; C. L. Bemis, of Carson City, and W. E. Sawyer, of Deadwood, S. D.

EEL RIVER & EUREKA.—The Eureka, Cal., Council has granted this company permission to build a switch from its main line across various streets in that city.

FREMONT, ELKHORN & MISSOURI RIVER.—Engineers of this company and of the Union Pacific are reported building a side track over the right of way of the U. P., to be used by both companies from the crossing of the two roads east of Ames, Neb., to run into that city about one mile.

GEORGIA & ALABAMA.—W. W. Hedgeman of Pittsburgh, Pa., has received the contract for dredging and piling for the terminals across the river from Savannah, Ga., work to be begun by April 1. (Feb. 10, p. 108.)

GEORGIA NORTHERN.—Rails are bought for 16 miles of road, according to report, on the extension from Doerum northwest toward Albany, Ga. (Feb. 10, p. 108.)

GRAND TRUNK.—This company, according to report, has agreed to build a branch line from Port Huron, Mich., south to the Jenks Ship Building Company's yards, provided business to the amount of 6 per cent. on $14,000 is guaranteed.

Montreal dispatches state that the company proposes to build a second track on the Middle Division between St. David's and Hamilton during this summer. This would make a continuous line of double track between Toronto and Suspension Bridge. It also intends to lay about 250 miles of new rail on the same division.

Surveys are reported in progress for a new line from the west into Battle Creek, Mich., to avoid a steep grade.

GULF & BRAZOS VALLEY.—W. A. Squires of Henrietta, Tex., is quoted in a Texas dispatch as stating that most of the grading is completed from Peck City, Tex., to Mineral Wells, and that several miles of track are laid out from Peck City. The company expects to have trains running between the two cities in 90 days. The line is projected to run from the Red River south through Henrietta, Jacksboro, Mineral Wells, Peck City, Granbury, Glen Rose, Hico, Hamilton, Lampasas, Llano, Fredericksburg, Comfort and San Antonio to Eagle Pass, where connection will be made with a Mexican line. (March 11, 1898, p. 188.)

GULF & NORTHERN.—A bill has passed Congress granting right of way to this company through Oklahoma and Indian Territory. Its route is practically the same as that of the Hutchinson, Oklahoma & Gulf given below.

GULF, BEAUMONT & KANSAS CITY.—The Texas Legislature has passed a bill authorizing this company to absorb the Gulf, Beaumont & Great Northern, and John H. Kirby, Vice-President and General Manager, announces that the line will be extended from its present terminus, 10 miles above Kirbyville, north about 60 miles to Jefferson. The G., B. & G. N. has recently built an extension of 10 miles. (Feb. 10, p. 108.)

GUYANDOTTE VALLEY.—This company was incorporated in West Virginia, March 1, to build a road from Huntington southeast about 75 miles up the Guyandotte River to Pineville, Wyoming County. J. L. Calwell of Huntington, W. Va., is among those interested.

HALIBURTON, WHITNEY & MATTAWA.—A deputation from the Town Council of Mattawa, Ont., have waited on the Government, asking that a charter be granted for this proposed line from Haliburton, on the Grand Trunk, north about 100 miles, via Whitney, to Mattawa. Application was made some months ago by Gordon & Sampson, solicitors, of Toronto, Ont. The proposed line would tap the timber of the Petawawa, Madawaska and South Nipissing rivers, and would give a route 80 miles shorter between Pembroke and Toronto, and bring Mattawa 85 miles nearer Toronto than Montreal. (Aug. 12, 1898, p. 587.)

HAMPTON & BRANCHVILLE.—The South Carolina Legislature has passed an act, approved Feb. 28, changing the name of this company to the North & South Short Line, and empowering it to extend the line from Mauldinton northeast through Hampton and Orangeburg to the North Carolina line, with power to connect with any railroad in that State or in Georgia or North Carolina, making a short line to Jacksonville, Fla. (Sept. 2, 1898, p. 639.)

HARRISBURG & SOUTHERN.—Surveys are to be begun about the middle of this month, according to report, for this line from the Eldorado Branch of the Illinois Central, near Eldorado, Ill., to run south to the Ohio River. J. J. Parish of Harrisburg, Ill., is among those interested. (Feb. 3, p. 92.)

HUTCHINSON, OKLAHOMA & GULF.—This company has filed new articles of incorporation in Oklahoma. Its capital stock is $20,000,000, and it is proposed to build about 1,000 miles of road. The main line, as proposed, is from a point in Kansas, to run south through Ponca City and Guthrie, Okla., to Denison, Tex., with branches east to Fort Smith, Ark., and northwest across the Territory of Oklahoma. The Directors are: A. G. C. Bierer, J. A. McNeal, G. E. McKeeby and H. L. Miller. The central office is Guthrie.

ILLINOIS CENTRAL.—Surveys are reported in progress by this company in southeastern South Dakota for a line through Clay County to Vermillion, and thence west through Yankton and into Chas. Mix County.

A committee of Dyersburg, Tenn., citizens, headed by Mayor W. A. Fowlkes, Jr., recently had a conference with the officials of the company at Memphis with reference to the building of the spur from Dyersburg west about 10 miles to the Obion River. They were assured, according to report, that the project would be taken up at an early day.

The Board of Trade of Austin, Minn., is seeking to get this company to extend its line from Lyle on the southern state line, to run north about 12 miles to Austin.

C. D. Smith & Co., Birmingham, Ala., have been awarded a contract for reducing the grade on the main line south of Jackson, Miss.

INTERNATIONAL DOCKS TERMINAL.—This company was incorporated in New Jersey March 2, with a capital stock of $1,500,000, to build a line from the West Side Connecting RR., in Jersey City, to extend southeast three miles to a point on Oyster Island in New York Bay. The incorporators and directors are: Daniel F. Appleton, Seymour Geary, and Arthur Lincoln, of New York; Solon Humphreys, Bergen Point; Daniel Pritchard, Brick Church; John H. Chilver, Roselle, and Henry Hayes, of Hackensack.

KANSAS CITY, HOT SPRINGS & NEW ORLEANS.—This company was incorporated in Arkansas March 1, with a capital stock of $1,350,000, to build from Hot Springs northwest about 90 miles through the counties of Gerland, Perry, Yell and Scott to Mansfield on the St. Louis & San Francisco, and the new connecting line of the Choctaw, Oklahoma & Gulf now building. The incorporators are: J. C. Donoghue, P. J. Ledwidge, M. H. Jodd, Jno. D. Ware and C. H. Weaver, of Hot Springs.

KANSAS CITY, PITTSBURGH & GULF.—Locating surveys are completed and right of way secured for a branch from Lemon, Tex., on the main line, to run southeast about 13 miles to Orange. Contracts for grading, bridging, etc., will probably be let in about a month, and for track laying later. The maximum curve is 4°, and the maximum grade five-tenths of 1%. There will be no iron bridges and about 1,200 lin. ft. of trestle. (Official.)

B. S. Josselyn, Superintendent of the Quincy Division, is reported as saying that the company proposes to expend during the coming season not less than $500,000 on the Omaha & St. Louis, and the Omaha, Kansas City and Eastern divisions. It is further proposed to build a new division of 65 miles from Quincy, Ill., east to Beardstown, to connect with the Baltimore & Ohio.

KANSAS, MISSOURI & NORTHERN.—This company was incorporated in Missouri March 2, with a capital stock of $600,000, to build a line from St. Joseph, Mo., north up the Missouri River, via Savannah, Fillmore and Tarkio, Mo., to Omaha, Neb., with a branch from Maitland northeast to Marysville, Mo. The officers are given under Elections and Appointments.

LAKE SHORE & MICHIGAN SOUTHERN.—Surveyors are reported making surveys for an extension of the Andover, O., branch south through Brookfield Township, Pa., near Yankee Run, along the west side of the Chenango River, to New Castle, Pa.

MEXICAN ROADS.—Mexico City press reports state that preliminary work is begun on the line from Toluca, the capital of the State of Mexico, to run south to Igula through the towns of Valle de Bravos, Sultepec and Temascaltepec. Branch lines will run to Huetamo in the State of Michoacan. The line is to be built by the Government of the State of Mexico, at an estimated cost of $2,000,000, and it is stated that 10 km. (6.2 miles) of track is already laid.

The Mexican Government has decided to offer a subsidy for building a railroad from Huisopa in the State of Sonora, and on the Sonora RR., to run west over the backbone of the Sierra Madras range to Chiuchupa in the State of Chihuahua.

MOBILE, JACKSON & KANSAS CITY.—Work is to be begun soon, according to report, on the extension from Merrill, Miss., northwest about 130 miles to Jackson. The line was completed from Mobile, Ala., to Merrill City, 50 miles, last year. (Sept. 2, 1898, p. 639.)

NATIONAL TEHUANTEPEC.—A press dispatch from Coatzacalcos, Mexico, gives the following facts with reference to the improvements now in progress on this line, which was acquired last year by Pearson & Co., the English contractors:

Parts of the line have already been rebuilt, and the remainng portion is being reballasted, and the road strengthened. The harbors at Coatzacoalcos, on the Atlantic side, and at Salina Cruz, on the Pacific side of the Isthmus, are being improved, the government having contracted to expend over $2,000,000 in this work. It is expected that as soon as these harbor improvements are completed there will be a heavy increase in the traffic across the isthmus, and that the necessity for double tracking the railroad will be manifested within the next few years.

NEW YORK CENTRAL & HUDSON RIVER.—The Beech Creek line, according to report, will build a new cut-off between Gillington and Clearfield, Pa., to avoid heavy grades.

NEW YORK, ONTARIO & WESTERN.—The General Manager confirms the statement that the company will build a line branch from a point on the Scranton Division, near Peckville, Pa., to Capouse colliery in the Keyser Valley, about 4¼ miles long. No contracts have been let yet, except for the arched tunnel, through which the line passes under the Delaware, Lackawanna & Western. Right of way is now being secured, and grading will be begun by the company's own forces as soon as the right of way is completed. (Feb. 24, p. 146.)

NORTH & SOUTH CAROLINA.—The South Carolina Legislature has passed a bill incorporating this company with a capital stock of not more than $5,000,000, to build a railroad from the northern line of the state in the counties of Chesterfield or Lancaster, to run south to Columbia. Among the incorporators are: Henry S. Haines, John S. Cunningham, W. B. Hatcher and Richard B. Turnstall. The company has also been incorporated in North Carolina and proposes to build through that state and into Virginia. (Feb. 17, p. 132.)

NORTH SHORE.—This company has won its suit in the injunction case against the Pennsylvania Co., and it is proposed to begin building at once. The company was formed about two years ago to build from Beaver Falls, Pa., to Rochester, and up the Ohio River to Conway, and thence to New Brighton, about 18 miles. W. A. Park, of the Park Fire Brick Co., Pittsburgh, is President. (Dec. 25, 1896, p. 907.)

OREGON SHORT LINE.—The General Manager writes that the company has not yet determined whether it will build an extension from Idaho Falls, Id., northeast to St. Anthony, but hardly thinks, however, that it will be built this year. (Feb. 24, p. 146.)

Among the improvements to be made this summer, according to report, will be widening the embankments between Dubois and Pocatello, Idaho, and cutting down the grade at Apex Hill and Feely.

PACIFIC & IDAHO.—This company has been incorporated in Idaho, with a capital stock of $8,000,000, to build from Weiser north 175 miles to Lewiston, with several branches. The directors are: Thomas W. Bates, Mart Patrie, George S. Glover, L. G. Wilkerson and O. E. Jackson.

PENNSYLVANIA.—The people of Muncy, Pa., are again agitating the question before the officials of this company of so changing the route that the main line shall run through Muncy. The line now crosses the river at a point several miles below Muncy.

PENNSYLVANIA ROADS.—P. E. McGovern of Dubois, Pa., has just completed seven miles of new road for Dubois & Hoover, from Glen Campbell, Pa., west to Ord Postoffice in Indiana County. (Jan. 13, p. 33.)

PEORIA, DECATUR & EVANSVILLE.—This company, which recently bought the Chicago & Ohio River, is to relay 35 miles of the road at an early date.

PHILADELPHIA & READING.—The double tracking on the line between East Mahanoy Junction and Port Clinton, begun last year, will be prosecuted with vigor this summer. The new second track now extends from East Mahanoy to Reynolds, and a large force of men is at work on the remaining section. (Nov. 18, 1898; p. 838.)

PONTIAC PACIFIC JUNCTION.—Press reports from Ottawa state that this company is arranging to build its proposed extension from Aylmer, Que., to Hull, and thence over the Ottawa River to Ottawa. Ties are being distributed and excavating and grading will be begun as soon as the snow goes. The company expects to have the line entirely completed in July, connecting Ottawa with Pembroke, 113 miles. (Feb. 10, p. 108.)

PORT ANGELES & EASTERN.—At a public meeting of the people of Port Angeles, Wash., it was voted to accept the proposition of this company to give a bonus of $50,000 in land on condition that the company expends $35,000 on the road before the first day of November. The company was incorporated in Washington last December to build a line from Port Angeles east about 30 miles to Junction City. The organization has been completed with officers as given under Elections and Appointments.

PRINCETON, SPRING VALLEY & LASALLE.—This company was incorporated in Illinois, March 1, with a capital stock of $100,000, to build from Princeton east about 20 miles via Spring Valley to Lasalle. The incorporators and first board of directors are: Ellsworth L. Rinehart, New York City; Jesse B. Barton and Alfred E. Case, Chicago; F. R. Bryant, Princeton, and Samuel Lorton, Davenport, Ia.

QUEEN & CRESCENT.—It is reported that the London Board of Directors has authorized an extension from Shreveport, La., west about 40 miles, via Wascom, Tex., to Jefferson, Tex., connecting with the Missouri, Kansas & Texas.

QUINCY & EASTERN.—The Rushville, Ill., Business Men's Association on March 1 decided to subscribe for $35,000 of stock, furnish grounds for terminals and aid in securing right of way for this line from Quincy, Ill., via Rushville to Beardstown and Havana. Terrance A. Clark, of Quincy, Ill., is a promoter. (Dec. 2, 1898, p. 868.)

RANDSBURG.—This line, which was built from Kramer, Cal., north 30 miles to Johannesburg last year, is to be extended this year north to Randsburg. This is on the reported statement of E. Van Etten, its President, who is also General Superintendent of the New York Central & Hudson River, New York City.

RICHMOND, PETERSBURG & CAROLINA.—The company has accepted several options on property in Richmond, Va., and as soon as the Board of Aldermen give the right of way through that city, work will be begun at several points. General James S. Negley, of 141 Broadway, New York, is Vice-President and General Manager. (March 3, p. 162.)

RIO GRANDE WESTERN.—Deal Bros. & Mendenhall, of Springville, Utah, have obtained the contract for building the first six miles of the extension from Provo City, Utah, northeast through the Provo Canyon toward Heber City, and grading is to be begun at once. (March 3, p. 162.)

ST. LOUIS & NORTHERN.—Articles of incorporation of this company were filed at Rock Island, Ill., March 1. The line is to run from Moline northeast about 35 miles to East Clinton, and thence south through Geneseo to Peoria. This is the northern extension of the old St. Louis, Peoria & Northern, which was recently incorporated under the name of the St. Louis & Northern Short Line. (Feb. 17, p. 132.)

ST. LOUIS, IOWA & NORTHERN.—This company was incorporated in Missouri March 1, with a capital stock of $3,000,000. It was formerly known as the Eldon & St. Louis, and proposes to build from Eldon, Ia., south through Iowa and Missouri to St. Louis, 274 miles. The first board of directors is as follows: S. H. Sawyer, J. E. Houghland, J. S. Barley, Charles S. Bierce and H. R. Baker, of Eldon, Ia.; William M. Mitchell, William M. Mitchell, Jr., and H. R. Berry, of St. Louis, and G. D. Crego, of Centreville, Ia. (Nov. 11, 1898, p. 820.)

SAULT STE. MARIE & HUDSON BAY.—The Ontario Government will grant a subsidy this season for a road from Missanabie, Ont., on the C. P. R., to run north 236 miles to James Bay. The charter is held by the above named company, which is trying to have its name changed to the Ontario & Western. Among the principal promoters are Messrs. Caldecott, Langnuir and Kilgour, Toronto, Ont.

SEABOARD & GULF.—This company has been incorporated in Georgia to build a line from Anderson, S. C., south across the State of Georgia to Carabelle, Fla., 447 miles. Among the incorporators are Geo. N. Brinson, Stillmore, Ga., and Geo. Ketchum, Macon, Ga. (Jan. 27, p. 73.)

SHAWNEE, OKLAHOMA & MISSOURI COAL & RAILWAY.—This company was incorporated in Oklahoma March 2, with a capital stock of $1,000,000, to build a line from Purcell, Ind. Ter., on the Atchison, Topeka & Santa Fe, to run northeast 150 miles through the counties of Cleveland and Pottawatomie, Okla., and the Seminole, Creek and Cherokee Nations, Ind. Ter., to Seneca, Mo., on the St. Louis & San Francisco. The incorporators are: C. J. Benson, Geo. McLagan, W. A. Havener, H. B. Dexter, M. J. Bentley, B. F. Mann and J. M. Aydelott.

SIOUX CITY & OMAHA.—Representatives of this company are reported as saying that contracts for grading will be let as soon as the right of way is secured along the entire distance, and that only the entrance into Omaha remains for arrangement. The line as projected is to run from Sioux City, Ia., to Omaha, Neb., about 90 miles. L. F. Wakefield of Sioux City, is among those securing right of way, and Mitchell Vincent, a railroad contractor of Onaway, Ia., is among the incorporators. (March 3, p. 162.)

SOUTH CAROLINA & GEORGIA.—The South Carolina Legislature has recently passed a bill permitting this company to build an extension from Gaffney, a terminus of a branch of the Ohio River & Charleston line, to run southwest about 20 miles to Spartanburg. It will parallel the Southern line between these points.

SOUTHERN.—General Manager F. S. Gannon is quoted as saying that the extension from Stevenson, Ala., northeast about 40 miles to Chattanooga, Tenn., is to be built at an early date. Final surveys are in progress. (Oct. 21, 1898, p. 769.)

SOUTHERN PACIFIC.—This company is endeavoring to secure right of way for an extension from West Anaheim, Cal., into the city of Anaheim, where it is proposed to build a new station.

Engineers have been making a survey for a line to replace the old line in Santa Barbara County. It is stated that the line will be shortened eight miles and nearly 50 miles of curves eliminated.

SPRINGFIELD, HARRISON & SOUTHERN.—This company was incorporated in Missouri Feb. 28, with a capital stock of $2,000,000, to build a line from Springfield, Mo., south through the counties of Greene, Christian, Stone and Taney, and through the county of Boone, Ark., to Harrison, with branches in the counties of Newton and Searcy, Ark. This would require about 65 miles of road in Missouri, and about 100 miles in Arkansas. The incorporators are: D. B. Lott, Archibald Woods, O. E. Owen and L. T. Woods, of St. Louis, and A. F. Clark, of Belleville, Ill.

TENNESSEE ROADS.—Surveys are reported in progress in Unicoi County for a narrow-gage road to run from Chester on the Ohio River & Charleston, south up South Indian Creek about 12 miles to Flag Pond. It is to be built by the J. M. Buck Lumber Co., and Wm. E. Uplegrove & Bro., to reach timberlands owned by them.

TEXAS NORTHERN.—The Attorney-General of Texas has approved of the charter of this company, incorporated with a capital stock of $100,000, to build a line from Anderson, Tex., south 12 miles to Stoneham, on the Conroe branch of the Atchison, Topeka & Santa Fe. T. P. Buffington of Anderson filed the application. (March 13, p. 162.)

UNION & AUGUSTA.—The South Carolina Legislature has passed an act incorporating this company, with a capital stock of $50,000, to build a railroad from Union, on the Southern, to run south about 20 miles to a point on the Seaboard Air Line between the towns of Carlisle and Clinton. Among the incorporators are: James T. Douglass, A. H. Foster, F. M. Farr and G. C. Perrin. The act was approved Feb. 27.

UNION PACIFIC.—Kilpatrick Bros. & Collins, of New Castle, Wyo., are reported to have obtained the contracts for the cut-off on the main line between Laramie, Wyo., and Rawlins.

UTAH & PACIFIC.—Rails are laid for 45 miles out from Milford, Utah, and the company must build 30 miles more to reach the Nevada state line. The contract calls for the completion of the line to that point by May 1. (Dec. 16, 1898, p. 904.)

WEST VIRGINIA CENTRAL & PITTSBURGH.—Several officers of this company are reported to have been investigating recently at Cumberland, Md., with a view to improving the terminal facilities at that place. It is proposed to make a connecting yard with the terminals of the Baltimore & Ohio in South Cumberland.

WEST VIRGINIA SHORT LINE.—President T. M. Jackson, of Clarksburg, W. Va., and Patrick Bennett, of Parkersburg, W. Va., contractor, have recently been in conference, according to report, with General Manager Geo. O. Burt of the Ohio River line at Parkersburg, and it is reported that grading is to be begun at once. The line, as projected, is to run from Clarksville, W. Va., northwest about 25 miles to New Marlinsville, on the Ohio River. (Feb. 3, p. 93.)

WILMINGTON SEACOAST.—The Superintendent is quoted as stating that the extension of half a mile up the beach at Wrightsville, N. C., is to be made this summer.

WISCONSIN ROADS.—Senator J. H. Green of Madison, Wis., has introduced a bill into the State Senate to vacate the Fourth Ward Park in Milwaukee for the purpose of using it as a Belt Line station. Mr. Green states that he is not at liberty to disclose the name of the new company.

Electric Railroad Construction.

ALBANY, N. Y.—At a meeting of the stockholders of the Albany, Helderberg & Schoharie Electric Ry. March 10, it was voted to increase the capital stock from $300,000 to $450,000. In addition to the proposed road the company will also build a spur line to Clarksville. The entire road, with the addition, will be 45 miles. (Feb. 17, p. 132.)

AMHERST, MASS.—The Northampton & Amherst, which has been spoken of for some time, has been organized with a capital stock of $150,000. The officers are: President, F. S. Coolidge of Fitchburg; vice-president, B. E. Cook, Jr., Northampton; secretary and treasurer, C. W. Wyman, Brattleboro, Vt. In addition to these P. L. Williams, C. K. Graves, Northampton; M. A. Coolidge, Fitchburg, and E. C. Crosby, Brattleboro, are directors. (Feb. 3, p. 93.)

ATLANTA, GA.—The Atlanta Consolidated St. Ry. Co. has again made application for a franchise along the East Point Chert road from the limits of Atlanta to Oakland City, to connect the roads in the two cities. (Jan. 13, p. 34.)

ARCADIA, PA.—The Arcadia Park Ry. Co., with a capital of $25,000, was granted a charter March 3, to build a road from Arcadia Park, Delaware County, along Garrett road to Baltimore Ave., in the borough of Langsdowne. Henry W. Brennen, of Philadelphia, is President of the company.

BLOOMSBURG, PA.—The Bloomsburg & Berwick Electric Ry. Co., capitalized at $250,000, will build between the places named in the title. Wm. Ridgeway and Joseph McCarrell, of Philadelphia, are among the directors. The main office of the company will be 723 Walnut street, Philadelphia.

BORDENTOWN, N. J.—The city of Burlington has granted a franchise to the Monmouth Traction Co. for its line on many of the principal streets. This

company proposes to build a railroad between Camden and Trenton, and is now operating a line between White Hill and Trenton. (Feb. 7, p. 133.)

CHERRYVALE, KAN.—C. J. Corbin, of this place, has been granted a franchise to build an electric railroad from Cherryvale to Corbin City, a new town one mile distant.

CHICAGO, ILL.—At a meeting of the City Council, Feb. 27, an ordinance was passed amending the Northern Electric Ry. Co.'s franchise, to expire in 1914, and to require the company to pay a fee of $50 per car, and in addition, 1 per cent. of gross receipts after five years; two per cent. for the third five years, and three per cent. for the rest of the time. The ordinance also permits the company to build additional lines, and to operate on parts of seven streets besides those covered by the former ordinance. (July 1, 1898, p. 485.)

CHIHUAHUA, MEXICO.—Julio Meyer, who, with others recently secured a concession for a street railroad in Chihuahua, informs us that all the material has been purchased from a New York concern, for the proposed horse road, but no company has as yet been incorporated. (Feb. 24, p. 146.)

CLEVELAND, O.—According to report, the Cleveland City Ry. will build a crosstown line on Gordon Ave. (Jan. 6, p. 16.)

COLUMBUS, O.—According to report, the Columbus St. Ry. Co. is considering the advisability of an extension from Columbus to Dublin.

CONWAY, S. C.—The Conway Seashore RR. Co. was incorporated Feb. 28, to build a railroad to be operated by electricity or any other motive power, from Conway on the Waccamaw River, to a point on the Atlantic Ocean near Withers Swash in Horry County; also to build a branch to Pawley's Island in Georgetown County. To reach Conway, it will be necessary to build a bridge across the Waccamaw River, or cross the river by ferry, as may be deemed advisable. The capital stock of the company is to be not less than $20,000 nor more than $200,000, and the company has the right to connect with any existing lines in Conway. Frank A. Burroughs, Benj. C. Collins, Donald T. McNeal, M. W. Collins, B. L. Buck and D. A. Spivey are the incorporators.

CUMBERLAND, MD.—Surveys have been completed for the several roads for which Geo. D. Howell, of Philadelphia, is Engineer. (Feb. 17, p. 133.)

EDGARTOWN, MASS.—The Edgartown St. Ry. Co., with a capital stock of $30,000, has filed articles of association with the Secretary of State. The company proposes to build an electric railroad between Edgartown and Cottage City. Among the persons interested are: Wm. A. Boland, New York; Wm. M. Butler, Boston; Edmund G. Eldridge of Cottage City, and John E. White, of Edgartown.

ELIZABETH, N. J.—Senator John Kean has petitioned the Elizabeth City Council for a franchise to build a double track electric street railroad through Elizabeth from Staten Island Sound to Westfield avenue, thence through Union Township to the Cranford Township line, where it will connect with the proposed road to Plainfield.

FLINT, MICH.—A. A. Talmage & Co., New York, according to report, have secured a franchise in this city to build an electric railroad to be operated in connection with a line to Long Lake and Fenton. Surveys are reported in progress. Chas. G. Moore, Olean, N. Y., is also interested.

GAINESVILLE, TEX.—It is reported that work will be begun on the Circle Belt Ry. this Spring. Harry Simon is interested.

GREENVILLE, MISS.—J. A. Gaboury, president of the Greenville Light & Car Co., has made a 10-year contract with the city for his company to build an electric railroad over principal streets in that city.

GREENWICH, N. Y.—The Secretary of State has certified to the proposed extensions of the Greenwich & Schuylerville Electric R. R., from Schuylerville to Stillwater, and from Schuylerville to Ft. Edward. At Stillwater the road will connect with the Stillwater & Mechanicsville St. Ry., and at Ft. Edward it will connect with the Glens Falls, Sandy Hill & Ft. Edward St. Ry. Joseph A. Powers, of Lansingburgh, N. Y., is the promoter of the G. & S. (Jan. 27, p. 74.)

HALIFAX, N. S.—The Bedford Electric Co. has secured an amendment to its charter which permits it to increase its capital stock to $2,500,000, and to extend the present road so as to include the city as well as the counties of Halifax and Lunenberg. The proposed roads are: One from the Three Mile House, which is west of Bedford, running through Bedford and thence northeast about five miles to Waverly; then south about 12 miles on the north side of Halifax Harbor to Dartmouth. Another line from the same starting place will be built west through head of St. Margaret's Bay, Chester and Mahone Bay to Lunenberg, 56 miles. A third line from the same starting point will be built on Kempt Road, and through the streets of Halifax, as may be agreed upon later.

The company, according to report, has acquired along the line of the proposed roads, water rights enough to secure an aggregate of 11,000 h. p., and will build power houses at several points on the line, one being at St. Margaret's Bay, about 18 miles from Halifax. Surplus power will be used for commercial purposes. M. M. Keefe of Halifax is President, and A. E. Soulis, Manager. (Jan. 20, p. 54.)

HARRISBURG, PA.—H. N. Van Vandt is reported interested in the new electric railroad between Lewistown and Reedsville.

HARTFORD, CONN.—Application has been made to the Railroad Committee for the incorporation of the West End Ry. Co., to build an electric railroad through certain streets of Hartford to Main street, in West Hartford.

HATBORO, PA.—J. M. Gregg, Philadelphia Bank Building, Philadelphia, informs us that an organization has just been perfected for the Hatboro Ry. Co., and that they are now endeavoring to secure the right of way for the proposed road which will be from Hatboro, in Montgomery County, about five miles, to Willow Grove. (Nov. 18, 1898, p. 839.)

HUNTNIGTON, ALA.—T. W. Pratt has petitioned the City Council for a franchise to build a street railroad in Huntsville.

INDIANAPOLIS, IND.—The new street railroad company which was recently incorporated to consolidate the Citizens Street RR., and the City Ry. Co., has a capital stock of $2,000,000. Under the terms of the consolidation the new company will expend $1,000,000 in betterments. (Feb. 24, p. 147.)

KANSAS CITY, MO.—Both houses of the Legislature have passed the franchise granting the Brooklyn Ave. Ry. Co. permission for the extension of the Northeast Electric Ry. franchise to 1925. In compensation for the extension of the franchise, the railroad is to build a steel viaduct over Agnes avenue and a steel bridge over the Belt Line at Brooklyn avenue. The Northeast line will be extended to Fairview avenue, and the Brooklyn avenue line to 31st street. Considerable grading will have to be done on Tenth street, and the entire line will be changed to be operated by electricity. (Feb. 10, p. 109.)

The Metropolitan St. Ry. Co. has also been granted a franchise to build an electric line on Broadway from Fifth street. (July 15, 1898, p. 523.)

LEETONIA, PA.—The Leetonia Ry. Co. was incorporated March 7, with a capital stock of $100,000. C. B. Farr, of Williamsport, is President, and the Directors are C. S. Horton, A. E. Botchford, M. F. Hammond, James H. Ball, A. T. Thompson, Williamsport; A. R. Spicer, Hoytville; E. G. Schieffelin, J. Harrison, Wellsboro; James L. Snyder, Leetonia.

LEWISTON, PA.—The Lewiston & Reedsville Electric Ry. Co. is about to build an extension of three miles, and is ready to receive quotations for material required. H. N. Van Zandt, General Manager, 41 West Market St.

LONG ISLAND CITY, N. Y.—The New York & Queens County Ry. will soon begin an extension from Flushing to Jamaica. This line was to have been built last fall, but was stopped by injunctions.

LOS ANGELES, CAL.—The contract for building the Alhambra Electric branch has been signed by the officers of the Los Angeles Terminal Ry. and the city of Alhambra. The conditions are that cars shall be in operation within five months. (Dec. 30, 1898, p. 939.)

LOWELL, MASS.—The extension which the Reading & Lowell St. Ry. proposes to build from Woburn to Wilmington and Tewksbury is 7½ miles. Part of the right of way has been secured, but no contracts are let. C. F. Woodard, President, Wakefield, Mass. (Feb. 3, p. 94; Feb. 24, p. 147.)

NEW YORK, N. Y.—The Metropolitan St. Ry. Co. has practically completed its Sixth and Eighth ave. underground electric lines, and cars are now running to Battery place, using Church and Barclay sts. to return to West Broadway. This finishes all but the Broadway cable line. (Oct. 7, 1898, p. 733.) A map showing the lines of the Metropolitan St. Ry., to be changed to conduit electric, with descriptive illustrations, was given in the Railroad Gazette of March 5, 1897.

NORTHAMPTON, PA.—The Northampton Central St. Ry. Co. was incorporated March 7, with a capital stock of $72,000. The Directors are M. P. McGrath, Worcester, Mass.; Edward J. Fox, William O. Hay, Thomas A. H. Hay, Easton, Pa. The President is Charles A. Richardson, Worcester, Mass.

NORTON, MASS.—Geo. W. Swazey and Damon A. Brooks, representing the companies which are building a system of street railroads through Bristol County, have petitioned the selectmen of Attleboro for permission to complete their system by laying a track through Attleboro connecting Pawtucket and Taunton, via Oakland. One point of this line will connect the center of Attleboro.

PEORIA, ILL.—The Spirit & Okoboji Lakes Rapid Transit Co. will begin about March 25 to build the seven miles of proposed road. Specifications regarding contracts, etc., are now ready. W. F. Ryan, 301 Main St., Peoria, is Manager. (Feb. 3, p. 94.)

PETERSBURG, VA.—The Richmond & Petersburg Electric Ry. Co., represented by Corbin Warwick and Wm. L. Royall, has petitioned the County Supervisors of Chesterfield for right of way for the proposed electric railroad on Petersburg Turnpike from Manchester to Petersburg. The petition was opposed by Francis R. Lassiter, Mayor of Petersburg, who proposes to build an electric railroad between Richmond and Petersburg via Swansboro and Chesterfield.

PITTSBURGH, PA.—Articles of association have been filed with the Secretary of State for the Swissvale & North Braddock St. Ry., which is to form a link in the proposed new line of the Monongahela Traction Co. system to East Pittsburgh. Several other companies have recently been incorporated to build this proposed extension. The names given as the organizers of the new company are: J. K. Hatfield (President), W. H. Ferguson, R. S. Robinson, R. P. McCurdy and W. S. Robinson, all of Swissvale. Surveys for the entire route of the line to East Pittsburgh have been completed. (Dec. 2, 1898, p. 869; Feb. 10, p. 110; Feb. 17, p. 133.)

PLAINFIELD, N. J.—The Westfield & Elizabeth St. Ry. Co. has been granted a franchise for its line through Clark Township. This permits this company to build a branch line connecting Westfield with Rahway and Boynton Beach. Col. Edwin W. Hine, Secretary, Prudential Building, Newark, N. J. (Feb. 10, p. 110.)

RAQUETTE LAKE, N. Y.—The Raquette Lake RR. Co., with a capital stock of $250,000, has been organized to build an electric railroad from Clearwater on the N. Y. C. & H. R. RR., 19 miles to Raquette Lake. It will touch Eagle Bay at the head of Fourth Lake, and it is believed it is built primarily to furnish an outlet for the Thompson Lumber Co. Samuel R. Callaway and Chauncey M. Depew are reported among the directors.

RIVERSIDE, CAL.—Frank A. Miller, General Manager of the Riverside & Arlington Ry. Co., has petitioned the City Trustees for an extension from Main St. up Seventh St. Seven miles of road was recently changed to electric, and the new line will probably be operated by electricity. (March 3, p. 163.)

ROME, N. Y.—It is reported that the Rome City St. Ry. Co., a horse road of 6.7 miles, will be improved and the cars operated by compressed air. Probably $100,000 will be expended on new and heavier rails, power plant, motors, cars, etc. At a meeting of the Directors of the company, March 2, it was decided to have the stockholders transfer their stock to the intended purchasers, the President of the road, John S. Wardwell and A. W. Soper. (Dec. 23, 1898, p. 925.)

ST. LOUIS, MO.—A bill has been introduced in the Legislature providing for the consolidation of the Southern Electric Ry., with the Lindell Ry.; for the change of motive power on Broadway, for the extension of the Southern on Chippewa St. to Morganford road, for connecting the Southern Electric with the Cass Ave. and the Citizens' lines. The bill also provides for the operation of funeral, mail, express and ambulance cars over all lines in St. Louis.

At a meeting of the stockholders of the Lindell Ry. Co., Feb. 28, the proposition was submitted to amend the charter of the company, authorizing the extension of its lines, and the completing of the plans of consolidation recently agreed to; to transfer all the Lindell property to the syndicate represented by Brown Bros., which purchased the Lindell and the Union Depot systems.

Frank Henry, Secretary of the Missouri RR. Co., is reported as stating that it is the intention of the company to operate its line with underground electric power. Engineers in the employ of Brown Bros., who recently purchased the property, have prepared plans for installing the underground electric system to replace the cable. The road is now operated partly by cable and electric.

The Midland Terminal Ry. Co. was chartered Feb. 24, with a capital stock of $75,000, to build an electric railroad 7½ miles long, in St. Louis, beginning at Biddle St., and running to Cherokee St. and Lemp Ave. The incorporators are: Valle Reyburn, Henry Vierling, L. E. Anderson, C. H. McMillan, G. W. Wilson, J. B. Kruse, J. C. Kenny and J. P. Rogers. Mr. Reyburn is Counsel for the company.

SAN DIEGO, CAL.—Graham E. Babcock, President of the San Diego, Pacific Beach & La Jolla RR. Co., informs us that the reports as to electrifying the road are premature, nothing as yet having been determined upon.

SARATOGA, N. Y.—The Saratoga & Northern Electric RR. has made application to build an extension to Glens Falls. R. E. Dunton, Counsel for the company. (Jan. 20, p. 54.)

SHEBOYGAN, WIS.—Manager J. N. Saemann of the Sheboygan Electric Power & Ry. Co. has filed a petition in Sheboygan Falls for an extension through that place. The company has obtained a lease of 99 years and the right of way to run the line over the toll road leading to Sheboygan Falls.

SHELTON, CONN.—It is stated that C. W. Blakslee & Son, New Haven, Conn., have the contract for building the nine miles of road for the Shelton St. Ry., and it is proposed to have the road in operation June 1. Andrew Radel of Bridgeport, Conn., is president. (Feb. 10, p. 110.)

STILLWATER, N. Y.—The Secretary of State, Feb. 27, certified two proposed extensions of the Stillwater & Mechanicsville St. Ry. The first is from the present line at Waterford, crossing the Hudson on the Waterford bridge, thence running south to Lansingburgh to connect with the Troy City Ry. The second is an extension through several streets in Waterford and then across the bridge over the Mohawk River at Saratoga avenue to Cohoes, where connection will be made with the Troy City Ry. and the Albany City Ry. (Dec. 2, 1898, p. 869.)

SYRACUSE, N. Y.—The Syracuse Construction Co., according to report, has the contract for building the Syracuse, Lakeside & Baldwinsville Ry., and Wm. Judson Smith, President of the Construction Co., is reported as stating that it will probably be in operation by May 1. A steel trestle over the D., L. & W. tracks at Stiles St. will have to be built to carry the road over the railroad tracks. Wm. Nottingham, attorney for the company, will soon make application to the State Railroad Commissioners for permission to increase the capital stock of the company from $250,000 to $500,000, to cover the cost of the building and the proposed extensions. (March 3, p. 163.)

TRENTON, N. J.—The Trenton, Lawrenceville & Princeton RR. Co., which was incorporated Feb. 25, is capitalized at $200,000, and will build a 10-mile road between the places named in the title. Surveys have been completed for the first five miles and contracts will be let in about two weeks for material and for building. One steel bridge 110 ft. long will be required. Bids will also be asked in about two weeks for four open and eight closed motor cars. The officers are: President, James L. Branson; Vice-President, H. C. Parry; Secretary and Treasurer, Wm. F. Sadler, Jr. Wm. P. Parry is General Manager, Superintendent and Purchasing Agent; also Electrician. C. E. Weir is Engineer. The general office of the company is 25 Forst-Richey Building, Trenton.

UTICA, N. Y.—Surveys are reported completed by Utica Belt Line St. RR., for the route from Turner street to Center street. John W. Boyle, President.

VISALIA, CAL.—A. J. Harrell, Manager of the Visalia & Tulare Motor RR., informs us that the company is considering the advisability of changing the road to an electric line, but have decided upon no plans. (Feb. 3, p. 94.)

WALTHAM, MASS.—The Waltham, Newton & Forest Hill St. Ry. Co. has been organized with a capital stock of $200,000, to build a line 13 miles long between Waltham and Boston, via Newton. (Feb. 3, p. 94.) The directors are: Chas. F. Avery, Newton; Chas. H. Wilson, Brookline, and Wm. M. Butler, of Boston.

GENERAL RAILROAD NEWS.

ATLANTIC & NORTH CAROLINA.—The reason for the bill recently introduced in the General Assembly of North Carolina, authorizing the sale of the state's stock in this property at a price not less than $300,000, is that the syndicate headed by W. J. Edwards of Raleigh, N. C., has made an offer for the property at the price named, $300,000. The state owns $1,266,500 of stock, which is valued at only about one-fourth par. (March 3, p. 163.)

BALTIMORE & OHIO.—A suit was filed in the U. S. Circuit Court at Baltimore, Md., March 2, foreclosing the terminal mortgage of 1894 for $8,500,000, which bears 4½ per cent. interest. Answers were also filed by the receivers to the suit of foreclosure of the £2,400,000 sterling on the London Division, in which the receivers admitted all the allegations in the bill of complaint. (Feb. 17, p. 134.)

Judges Goff and Morris, at Baltimore, on March 3, signed a decree directing the sale of $3,000,000 in bonds of the Parkersburg Branch, which, under the agreement with the trustees, can be sold to the highest bidder. The sale is to take place at public auction on a day to be fixed by the Special Masters, and no bid is to be received until $25,000 has been deposited by the bidder.

BROOKLYN & BRIGHTON BEACH.—August Belmont, Jas. Jourdan, Geo. I. Murphy and Aaron S. Robbins have consented to act as a reorganization committee, and bondholders are requested to deposit their bonds with August Belmont & Co., New York, on or before March 11. There has recently been a judgment of foreclosure and sale entered against the property. Receivers were appointed Jan. 14, 1898. (April 29, 1898, p. 318.)

BUFFALO, ST. MARY'S & SOUTHWESTERN.—Ridgeway, Pa., press reports state that the property of this company and of the Shawmut Coal Mining Co., with large tracts of land in Elk and Jefferson counties, Pa., has been sold to a syndicate of New York capitalists by President B. Frank Hall and General Manager Andrew Kaul for $4,000,000. The railroad extends from Clermont, Pa., to Hyde, 45.67 miles, with a branch from the main line to St. Mary's 0.62 mile. It is stated that the road is to be extended to form a trunk line through Central Pennsylvania.

CENTRAL VERMONT.—The date of foreclosure sale is fixed at March 21. (Feb. 3, p. 95.)

CHICAGO & ALTON.—Notwithstanding the statement of President Blackstone, noted last week, announcement is made that more than a majority of the shares were deposited up to March 1, at the offer of $175 per share common, and $200 per share preferred. The United States Trust Co., New York, gives notice that the purchase price for the stock already bought will be payable at the office of the company on and after March 15, and that the time for the deposit of stock under the terms has been extended until April 1. (March 3, p. 163.)

DES MOINES UNION.—President F. C. Hubbell announces that this road has been leased to the Wabash and to the Chicago, Milwaukee & St. Paul for a term of 20 years from May 1. The road comprises 17.7 miles of line in the city of Des Moines, Ia., and is used as a terminal by the Wabash, the Chicago Great Northern and the Des Moines Northern & Western. The D. M., N. & W., which owns one-fourth share in the Des Moines Union, was recently acquired by the C., M. & S. P., which accounts for the change in leases.

EASTERN RAILROAD IN NEW HAMPSHIRE.—The terms upon which the Boston & Maine proposes to take this line are the giving of fifty-five-hundredths of a share of its common stock for each share of the stock of the New Hampshire road, or it will buy the shares outright at $110. (March 3, p. 163.)

FLORIDA CENTRAL & PENINSULAR.—John L. Williams & Co., Richmond, Va., head of the syndicate that recently bought the Seaboard Air Line, have obtained control through W. Bayard Cutting and R. Fulton Cutting of a majority of the shares of the F. C. & P., embracing 944.25 miles in South Carolina and Florida. It is understood that no changes will be made immediately in the management of the purchased property, though it is believed that later on plans will be developed looking to the closer union between the F. C. & P., the Georgia & Alabama and the S. A. L., all of which are now controlled by the syndicate. By bridging the gap of about 85 miles between the Florida Central at Columbia, S. C., and the S. A. L., in the southwestern portion of North Carolina, the three will become one system. (S. A. L., Feb. 3, p. 95.)

HOCKING VALLEY.—This company was incorporated on Feb. 25, as successor to the Columbus, Hocking Valley & Toledo, sold under foreclosure Feb. 24. (C., H. V. & T., March 3, p. 163.)

JACKSONVILLE, TAMPA & KEY WEST.—Holders of first mortgage 6 per cent. bonds, due 1914, who are dissatisfied with the proposed agreement of the Pennsylvania Company for Insurance on Lives and Granting Annuities, under which 50 per cent. assessment is levied, are requested to communicate with F. J. Lisman, 30 Broad street, New York. (Feb. 24, p. 147.)

JUNCTION.—The stockholders of this company on March 1 ratified the lease of the property to the Philadelphia, Wilmington & Baltimore of the Pennsylvania. The line joins the Pennsylvania system in Philadelphia, and is 3.56 miles in length. It has been operated by the Pennsylvania for some years.

LOUISVILLE, EVANSVILLE & ST. LOUIS.—Judge Woods of the U. S. Circuit Court at Indianapolis, Ind., on Feb. 27, ordered Geo. T. Jarvis, receiver, to refund the $179,000 of receiver's certificates issued by him at 4 per cent. interest, and which expired March 1.

MEXICAN CENTRAL.—Fifty equipment and collateral gold bonds have been drawn for payment at par and accrued interest at the Old Colony Trust Co., Boston; Manhattan Trust Co., New York, or Glyn, Mills, Currie & Co., London, on or after April 1. (Feb. 24, p. 148.)

OHIO SOUTHERN.—The transfer of this mortgage to the first mortgage bondholders was made by the receivers at midnight March 4. (March 3, p. 163.)

ST. LOUIS, KANSAS CITY & COLORADO.—E. G. Farish, appointed Special Master by Judge Adams to ascertain the amount of preferential claims and bonded indebtedness of the company, made his report Feb. 24. The totals reach about $7,000. The bonded indebtedness is given at $1,381,000, held by the Atchison, Topeka & Santa Fe. The total floating indebtedness is $271,464. The petition of the attorneys of the Wabash for that company's claim for $156,799 was ordered paid. The St. L., K. C. & C. extends from Northline Forest Park, St. Louis, Mo., to Union, 55.24 miles, with a branch from Bonner to Dripping Springs, 1.7 miles. It was formerly controlled by the Atchison, and went into the hands of a receiver Sept. 12, 1894.

SAN DIEGO, PACIFIC BEACH & LA JOLLA.—This line, which extends from San Diego, Cal., to La Jolla, 13.54 miles, has been sold to Graham E. Babcock and associates. There is talk that the line will be changed to electricity, but nothing has yet been determined. The new officers of the company are given under Elections and Appointments.

SEABOARD AIR LINE.—The South Carolina Legislature has passed a bill, approved Feb. 27, amending the charters of the Georgia, Carolina & Northern and the Chesterfield & Kershaw, so that they may merge and consolidate their capital stock, etc., with the Raleigh & Gaston. This is in accordance with the plan of consolidation already noted. (Feb. 17, p. 134.)

SOUTHERN.—A circular has been issued stating that it is the purpose of the company to abandon the branch from York, Ala., west 14 miles to Lauderdale, Miss., and that the rails will be taken up at once.

UNION PACIFIC.—Over 75 per cent. of the capital stock of the Oregon Short Line has been deposited for exchange under the U. P. offer, and the Mercantile Trust Co., New York, gives notice that the privilege of such exchange will be withdrawn after March 15. (March 3, p. 164.)

UNION PACIFIC CENTRAL BRANCH.—At the meeting of the bondholders of the Atchison, Colorado & Pacific and of the Atchison, Jewell County & Western, held in Boston March 1, it was voted to accept the offer of 75 per cent. of certificates of deposit in new 4 per cent. bonds, secured by mortgage at $12,000 per mile, and guaranteed by the Missouri Pacific. (Feb. 24, p. 148.)

WEST JERSEY & SEASHORE.—The company offers to redeem the $1,000,000 West Jersey 7's, maturing April 1, and the $497,000 Canada & Atlantic 6's due Oct. 1, at per and interest, less 3 per cent. discount. (Feb. 10, p. 111.)

Electric Railroad News.

BALTIMORE, MD.—At a meeting of the stockholders of the Baltimore City Passenger Ry. Co. and the Baltimore & Northern Electric Ry. Co., March 2, resolutions were adopted to consolidate the two companies. This action is in pursuance of the plan for the merging of the different street railroads in Baltimore into the United Railways & Electric Co., of Baltimore. The final steps in the organization of the new company were taken March 6, when the Board of Directors authorized a mortgage of $38,000,000 4 per cent. bonds in favor of the Continental Trust Co. (Feb. 17, p. 134.)

BROOKLYN, N. Y.—Announcement is again made that negotiations for the consolidation of all the elevated and surface railroads in Brooklyn will soon be effected. The purchase of the Nassau Electric RR. by the Brooklyn Rapid Transit Co. was completed March 3, and arrangements have been made to take up the whole of the $9,500,000 of new stock which was issued by the B. R. T., to acquire control of the Nassau road. It is calculated that the union of all the companies will result in a yearly saving of over $1,500,000 in the operating expenses.

CHICAGO, ILL.—The consolidation of the nine suburban feeder lines of the North and West side railroads was effected Feb. 27. The Chicago Consolidated Traction Co. has been incorporated with a capital stock of $15,000,000, as the new company. The incorporators are representatives of the different consolidated companies. The officers reported elected are: John M. Roach, President; W. F. Burbeck, Vice-President; C. F. Marlow, Secretary and Treasurer. (Jan. 13, p. 30; Feb. 24, p. 148.)

CLEVELAND, O.—The stockholders of the Akron, Bedford & Cleveland voted Feb. 6 to give a mortgage for $500,000 to the Dime Savings & Banking Co. of Akron as trustee. The original proposition was to secure a mortgage for $1,000,000, for which $300,000 was to take up the present mortgage indebtedness before maturity. (Jan. 20, p. 56.)

DAYTON, O.—The Dayton & Xenia Traction Co., which proposes to build a 16-mile road between Dayton and Xenia, has filed a $300,000 mortgage with the Fidelity Insurance, Trust & Safe Deposit Co. of Philadelphia. Many contracts for building this road are let. (Feb. 24, p. 146.)

DENVER, COL.—The consolidation of the electric and cable street railroad lines in Denver was effected March 3, when articles incorporating the Denver City Tramway Co., with a capital stock of $5,000,000, were filed. (Feb. 17, p. 134.)

FORT WORTH, TEX.—Application has been made to the District Court in Fort Worth for a receiver for the City Ry. Co. Judge Dunklin has granted a temporary injunction to prevent sale of the property and fixed March 25 as the date for hearing on petition for a receiver. Morgan Jones is the plaintiff. (March 3, p. 164.)

INDIANAPOLIS, IND.—The Indianapolis St. Ry. Co. has been incorporated, with a capital stock of $2,000,000, as the consolidated company of the Indianapolis street railroads. The officers are: President, Hiram B. Wasson, Philadelphia; directors, Henry Jameson, Harold Hibben and Julius A. Lemke, of Indianapolis; Randall Morgan, of Philadelphia, and Hugh J. McGowan, of Kansas City. (March 3, p. 164.)

NEW ORLEANS, LA.—The foreclosure sale of the Crescent City RR., in accordance with the plan of reorganization, is set for March 20. The plan for the exchange of bonds for the consolidation of the New Orleans Traction Co., the Crescent City RR. and the New Orleans & Lake RR. Co. was outlined in this column Dec. 16 (p. 906).

OSWEGO, N. Y.—The Oswego St. Ry. will be sold at public auction April 10 by Sheriff Enos. C. Sidney Shepard, a bondholder, it is reported, will buy in the property. Ever since the road was built it has been handicapped for want of capital. Receiver Tidman estimates that it will cost $100,000 to properly re-equip the road with a power house and a sufficient number of cars to continue operation. (Dec. 23, 1898, p. 926.)

PORTLAND, ME.—Edwin W. Decker, Superintendent of the Portland & Yarmouth Electric Ry., has resigned, his resignation taking effect March 1. L. B. Wheilden assumes the duties of Superintendent in addition to those of General Manager.

QUINCY, MASS.—The Railroad Commissioners have approved the purchase of the Braintree St. Ry. Co. by the Quincy & Boston St. Ry. Co. (March 3, p. 164.)

WASHINGTON, D. C.—Negotiations are reported in progress for the transfer of the Metropolitan RR. and the Columbia Ry. to the Stevens-Crosby syndicate, who propose to consolidate all the street railroads in Washington. The Washington City RR. Co. will be incorporated for this purpose. The Anacosta & Potomac River RR., the Belt Ry., the Capital Traction Co., and the City & Suburban, of which O. T. Crosby is President, will form part of the consolidated company. (Feb. 10, p. 112.)

TRAFFIC.

Traffic Notes

The investigation of export rates on corn from west of the Mississippi River, which the Interstate Commerce Commission was to begin at Chicago March 9, has been postponed, and the first hearing will be held March 13.

Chicago papers report that on the Erie road tickets for 10 or more persons traveling together are sold at two cents per mile per capita, with a discount of 10 per cent., where the road is entitled to a differential. The minimum rate per capita will be 25 cents for adults and 15 cents for children.

The Northern Pacific announces that, beginning next week, there will be two through passenger trains daily each way between St. Paul and the Pacific Coast. One train is called the Puget Sound Limited and the other the Oregon Limited; from which it would seem that any one who wishes to travel as just an ordinary passenger, on an ordinary train, will necessarily "get left."

On Feb. 28 the members of the Interstate Commerce Commission, at their office in Washington, held a conference with the chief officers of a dozen of the principal railroads west of Chicago. This conference appears to have been of the same nature as the conferences lately held between the Commissioners and the presidents of the trunk lines and Eastern roads. Nothing is given out as to the results of the conference.

It is reported from St. Paul that the reduced tariff for the transportation of coal from Duluth to New Ulm and other points south of St. Paul, recently issued by the Minnesota State Railroad Commission, will not be adopted by the railroads interested, and that the Attorney-General of the State will bring an action in the courts to compel compliance with the Commission's order.

The Houston, East & West Texas now issues permits, under certain restrictions, for passengers to travel on freight trains. This arrangement is made chiefly for the benefit of commercial travelers, and permits will not be issued to women or children. Tickets will not be sold to places where there is no station or to stations where freight trains do not stop for freight business. Each permit contains a contract releasing the railroad from liability.

Atlanta papers report that the cotton-rate war, from that city and other interior points to the Atlantic Seaboard, has been settled; and that tariffs will be restored on March 15. The report says that "of course there was no agreement to maintain the rates when restored, because that would be contrary to the law;" but when the meeting of the general freight agents broke up, "everybody looked satisfied." The war was not a serious one, because the cotton movement at this time is light.

Chicago Traffic Matters.

Chicago, March 8, 1899.

It is quite probable that the trouble over export corn rates from this city and Mississippi River points to the east will be amicably adjusted without the interposition of the Interstate Commerce Commission. A hearing on the question has been set for March 13, but from present indications it will not be held. Officers of the Mississippi River-Chicago line say they recognize some discrimination against local shippers in the present rates, but claim that the trouble originated with the eastern lines out of St. Louis. These roads put in the 13½-cent rate several years ago, and the roads to the north were compelled to meet them through the other gateways. The St. Louis roads will probably either advance their rates or the lines to the north will lower theirs in a way to remove the difference.

The Chicago Great Western has withdrawn from the Chicago-St. Paul passenger agreement, claiming that the agreement as it now stands causes it a direct financial loss of $2,000 a month. It will withdraw March 31.

It seems that the recent meeting of presidents of the western roads and members of the Interstate Commerce Commission was not entirely satisfactory to the latter; not enough lines were represented. The Commission has requested another conference with the presidents March 24, at which time it is hoped every important road west of this city will be represented.

The old stock yards terminal charge has bobbed up again. The most recent finding in this case was that of the Interstate Commerce Commission, which ruled about a year ago that the $2 trackage charge on each car of live stock delivered at the yards was too high, and should be reduced to $1. The railroads ignored this ruling, and the United States District-Attorney, acting on behalf of the Interstate Commerce Commission, has now asked for an injunction restraining the western roads delivering cars at the yards from exacting the charge. The Court has ordered the defendant companies to answer on or before March 20. The state court ruled that it had no jurisdiction in this matter, and the Illinois Railroad and Warehouse Commission found the $2 charge to be a legal one.

By a change in time on the Chicago, Burlington & Quincy, the Denver train now leaving this city at 10.30 will hereafter depart at 1.30 p. m., and the night Omaha train, now leaving at 10.30, will leave at 11.20.